Deactivation and Decommissioning Focus Area

QUARTERLY REPORT – JULY 2001

April — June 2001 Activities

Office of Science & Technology

NETL

D&D Focus Area

On the Cover

Clockwise from Upper Left:
The **Integrated Excavation Control System (IECS)** addresses needs at Fernald for excavation of contaminated soil during below-grade D&D.

The **Vehicle and Cargo Inspection System (VACIS)** is demonstrated at LANL.

The **Pit Viper** will be used in the characterization and decontamination of plutonium processing canyons at Hanford and Savannah River.

The **Universal Demolition Processor** allows Fernald to reuse a portion of the concrete generated by D&D activities.

The purpose of this document is to provide an overview of the Deactivation and Decommissioning D&D Focus Area and to update readers on the program's current activities. It presents a synopsis of the current program status and recent accomplishments, along with overviews of planned activities, program issues, and opportunities. Quarterly reports are distributed to U.S. Department of Energy DOE headquarters and operations office managers, site personnel, site operating contractors, technology developers, principal investigators, regulators, and other stakeholders. Issued in January, April, July, and October, the D&D quarterly reports summarize the activities of each preceding quarter. Quarterly reports and further information about the D&D Focus Area DDFA are found on the World Wide Web at *www.netl.doe.gov/dd*. Technologies are usually identified by their discrete tracking numbers within the Technology Management System (TMS) operated by DOE's Office of Science and Technology (OST). Providing access to information about OST programs, technologies, and linkages to EM problems, TMS is found on the World Wide Web at *ost.em.doe.gov/tms/home/entry.asp*.

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1.0 HIGHLIGHTS

Deactivation and Decommissioning Focus Area (DDFA) Announces Selection of Two Large Scale Demonstration and Deployment Projects (LSDDPs)

The Idaho National Engineering and Environmental Laboratory (INEEL)

On April 12, 2001, a Selection Statement was signed to officially select two LSDDPs to be managed by the DDFA at the National Energy Technology Laboratory (NETL). One of the LSDDPs awarded was for $4 million to the Idaho National Engineering and Environmental Laboratory (INEEL) to deploy improved decontamination and decommissioning (D&D) technologies in reactor and fuel pool facilities and to demonstrate improved material disposition technologies. The other new LSDDP awarded was for $3 million to the Los Alamos National Laboratory (LANL) to deploy improved technologies in their Tritium Systems Test Assembly facility and other DOE sites with surplus tritium facilities. With the addition of the INEEL and LANL LSDDPs, there are nine LSDDPs in the DDFA's investment portfolio.

DDFA FY2001 Mid-Year Review and Decommissioning Symposium a Great Success

On April 17–19, 2001, NETL's DDFA held its fiscal year 2001 Mid-Year Review (MYR) and Decommissioning Symposium in Miami at Florida International University's (FIU) Roz and Cal Kovens Conference Center. There were 232 participants at the MYR/Symposium including technology end users from DOE headquarters and field locations, DOE site contractors, commercial decommissioning firms, several nuclear utilities, and technology developers and vendors. During the meeting, a six-member Review Panel comprised of members of the DDFA's End User Steering Committee and of the DOE/Utility D&D Consortium evaluated the relevance and technical merit of nearly 30 projects managed by the DDFA. The Decommissioning Symposium included eight sessions with over 50 presentations. Special events included addresses by James Fiore, Deputy Assistant Secretary, DOE-EM Office of Site Closure; John Bradburne, President, Fluor Fernald; and Gerald Boyd, Deputy Assistant Secretary, DOE-EM Office of Science and Technology, whose presentation included a special dedication to the late Dr. Paul Hart.

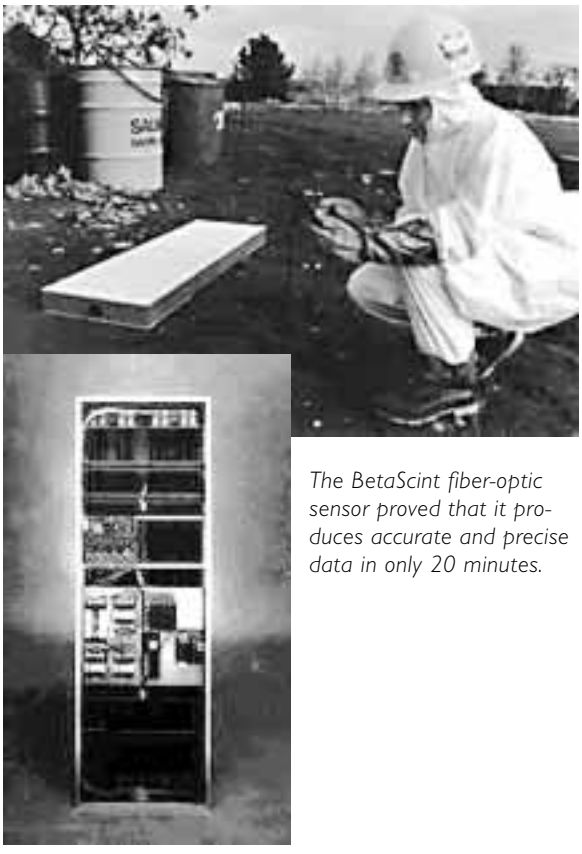
Sessions included workforce issues; stakeholder involvement; D&D status and lessons learned; impact of improved D&D technologies; long-term stewardship; environment, safety, and health; and materials disposition. The MYR/Symposium also included 17 exhibit booths and seven live technology demonstrations. Keynote speakers included Brent Armstrong, NETL Associate Director in the Office of Environmental Management and Defense Programs; Jim Fiore, Deputy Assistant Secretary, EM Office of Site Closure; Gerald Boyd, Deputy Assistant Secretary, EM Office of Science and Technology; and John Bradburne, President, Fluor Fernald. A special dedication held in the memory of Dr. Paul Hart was hosted by Ali Ebadian, Director, Hemispheric Center for Environmental Technology at FIU; Gerald Boyd; and Don Carson, Director, International

Environmental Technology and Training Center of the International Union of Operating Engineers.

Since its inception at NETL in 1995, the DDFA has conducted over 130 demonstrations and over 90 of those improved D&D technologies have been deployed over 310 times by the DDFA's customers in decommissioning projects at DOE sites. Widespread deployment of these and other improved D&D technologies is expected to reduce the cost of DOE's deactivation and decommissioning projects by 25–50 percent.

BetaScint Proves Value in Brookhaven Graphite Research Reactor (BGRR) Decommissioning Project.

Under an Accelerated Site Technology Deployment (ASTD) project sponsored by NETL's DDFA, the BetaScint fiber-optic sensor was used to characterize soils for strontium-90 contamination. The sensor was deployed during removal of underground ducts, piping, and systems in the BGRR decommissioning project. The BetaScint fiber-optic sensor proved that it produces accurate and precise data in only 20 minutes. The conventional EPA laboratory methods to quantify strontium take two to four weeks. During its deployment in the ASTD project, the BetaScint fiber-optic sensor was used to determine if strontium contamination had leaked from underground piping and ducting into the surrounding soil and the extent of soil removal required if there was leakage. The quick turnaround time for analytical results from BetaScint enabled the workers to determine immediately whether additional soil excavation was necessary due to contamination. Other DOE sites with possible contamination from beta-emitting isotopes will also benefit from the use of the BetaScint fiber-optic sensor.



The BetaScint fiber-optic sensor proved that it produces accurate and precise data in only 20 minutes.

DDFA Excels in Customer Survey

Results from a performance survey of 14 focus area customers indicated that the DDFA is excelling at meeting the needs of its DOE Headquarters and Field customers. About 96 percent of the ratings were Outstanding or Satisfactory. The Survey included 17 criteria within the major categories of Participation with Field and Headquarters, Science and Technology Contributions to Customers, Planning and Coordination, and Technical and Program Management. In addition to ratings, survey responders provided comments to justify their ratings. The comments were overwhelmingly supportive of the DDFA's efforts. One example of these comments is "of the 38 years I have worked in Government programs, this is absolutely the best one I have encountered. High quality personnel are overall the best I have worked with also." The results of this survey indicate that the DDFA is developing and executing a sound strategy that meets the needs of its Headquarters and Field Customers.

Landmark D&D Workshop Held in Argentina.

On May 21–24, 2001, NETL's DDFA led a seven-member delegation from the U.S. to participate in the first D&D workshop with the National Atomic Energy Commission (CNEA) in Buenos Aires, Argentina. This D&D workshop was held as part of the activities of the Joint Coordinating Committee for Radioactive and Mixed Waste Management, which was implemented under an international agreement between DOE and CNEA. Participants from the U.S. included DOE-NETL, DOE-Headquarters, SAIC, TLG Services, and Florida International University. The workshop consisted of a series of presentations from the U.S. and CNEA participants including status of decommissioning in DOE, U.S. utilities, and Argentina; state-of-the-art decommissioning technologies; project management software; cost estimating; regulations; and planning. The goal of the workshop was to identify future collaborative activities between DOE and CNEA. Several promising joint activities were identified, including a student exchange program, development of D&D technologies by universities in Argentina, deployment of U.S. technologies in Argentina's decommissioning projects including oxy-gasoline cutting torch and personal ice cooling system, deployment of mature characterization and robotics technologies from Argentina in DOE's decommissioning projects, and DOE assistance to Argentina in cost estimating and decommissioning planning. The implementation of these joint activities will be mutually beneficial to decommissioning projects in DOE and Argentina.

2.0 Project Summary Table

The following table summarizes the Technical Task Plans for the D&D Focus Area Core Program and related Crosscutting and Industry Program contracts. Project descriptions follow in subsections 2.1 through 2.5 and are organized by the work breakdown structure (WBS) element listed here.

Project Number	D&D WBS Element	Project Name	Page
AL08DD21	Demonstrations and Industry Approaches	Large-Scale Demonstration: Los Alamos National Laboratory Transuranic Waste	8
OH08DD21	Demonstrations and Industry Approaches	Large-Scale Demonstration: Mound Tritium Facilities	9
ID08DD21	Demonstrations and Industry Approaches	Large-Scale Demonstration: Idaho National Engineering and Environmental Laboratory Fuel Storage Canals and Underwater and Underground Facilities	12
RL08DD21	Demonstrations and Industry Approaches	Canyon Disposition Initiative	13
SR09DD61	Demonstrations and Industry Approaches	Highly Selective Nuclide Removal System—Accelerated Site Technology Deployment	14
OH19DD61	Demonstrations and Industry Approaches	Integrated Excavation Control System (IECS) (formerlyMobile Work Platform)—Accelerated Site Technology Deployment	15
RL09DD61	Demonstrations and Industry Approaches	Remote Size Reduction for Large Hot Cell Deactivation—Accelerated Site Technology Deployment	15
AL08SD10	Demonstrations and Industry Approaches	Los Alamos National Lab Decontamination and Volume Reduction System—Accelerated Site Technology Deployment	16
NV09DD61	Demonstrations and Industry Approaches	Oversize Transuranic Waste Laser Cutting System, Nevada Test Site—Accelerated Site Technology Deployment	16
CH30DD11	Demonstrations and Industry Approaches	Smart 3-D Characterization of the Brookhaven Graphite Research Reactor (BGRR)	17
RF09D21 RF08SD10 RF09DD61	Demonstrations and Industry Approaches	Rocky Flats Environmental Technology Site—Accelerated Site Technology Deployment and the D&D Initiative	16
OH30DD11	Demonstrations and Industry Approaches	Diamond Wire Saw Demolition and Size Reduction of a Reactor Bioshield—Accelerated Site Technology Deployment	20
OH10DD21	Demonstrations and Industry Approaches	Reducing, Reusing, and Recycling Concrete and Segmenting Plate Steel and Tanks Utilizing a Universal Demolition Processor—Accelerated Site Technology Deployment	20
OH10DD31	Demonstrations and Industry Approaches	Improved Measurement and Monitoring Systems—Accelerated Site Technology Deployment	21

Project Number	D&D WBS Element	Project Name	Page
OH00DD31	Demonstrations and Industry Approaches	Intrusive and Non-Intrusive Characterization through Concrete Walls and Floors—Accelerated Site Technology Deployment	22
NV01DD32	Demonstrations and Industry Approaches	Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Innovative characterization at Nevada—Accelerated Site Technology Deployment	23
SR01DD22	Demonstrations and Industry Approaches	Contaminated Large Equipment—Accelerated Site Technology Deployment	24
RL01DD11	Demonstrations and Industry Approaches	Deployment of Improved Technologies for Cleanout of the F-Reactor Fuel Storage Basin—Accelerated Site Technology Deployment	24
	Demonstrations and Industry Approaches	Deactivation and Decommissioning Consortium	25
Multiple Projects	Demonstrations and Industry Approaches	Florida International University	26
Multiple Projects	Demonstrations and Industry Approaches	International Agreement with AEA Technology	27
DE-AC21-93 MC30176	Facility Characterization	Three-Dimensional Integrated Characterization and Archiving System	30
DE-AR26-98 FT 40365	Facility Characterization	Fast Response Isotopic Alpha Continuous Emissions Monitor	31
NT40768	Facility Characterization	Technology for Real-Time Measurement of Surface and Airborne Beryllium	32
DE-AR26-98 FT 40367	Facility Decontamination	High Productivity Vacuum Blasting System	33
FT06IP01	Facility Decontamination	Technology Deployment for Asbestos Destruction	34
Multiple Projects	Facility Dismantlement and Material Disposition	Robotics Crosscutting Program	35
DE-AC21-93 MC30179	Worker Safety/Other	Protective Clothing Based on Permselective Membrane and Carbon Adsorption	37
DE-AR26-98	Worker Safety/Other	Modular Manipulator for Robotic Applications	38

2.1 Demonstration and Industry Approaches

Los Alamos National Laboratory (LANL) Transuranic (TRU) Waste Characterization, Decontamination, and Disposition Large Scale Demonstration and Deployment Project (LSDDP)

Objective and Scope: The LANL TRU Waste Characterization, Decontamination, and Disposition LSDDP addresses the characterization, decontamination, and volume reduction of oversized metallic TRU waste currently in storage at TA-54, LANL's storage and disposal area. The LANL TRU LSDDP reflects the cooperative interest of industry, government, and academia to bring collaborative expertise and strength to DOE's TRU decontamination and decommissioning (D&D) program at LANL and elsewhere within the DOE complex. LANL currently has 1,500 m^3 of TRU waste in inventory, stores 313 plutonium-contaminated gloveboxes in a 24,000 ft^2 facility, and expects to generate another 2,500 m^3 from ongoing operations in coming years.

The major objectives of this LSDDP are to

- Identify technologies that are ready for deployment for the characterization, decontamination, and volume reduction of TRU waste/TRU contaminated metallic objects.
- Identify technologies that are ready for demonstration.
- Demonstrate those technologies with potential to reduce cost, risk, and schedule and that are amenable for direct field application at LANL and elsewhere in the Department of Energy (DOE) complex.
- To the extent possible, compare technologies "side by side" with baseline approaches to evaluate their advantages (cost, risk, and schedule) and to refine or validate baseline assumptions.
- Capitalize on the combined corporate management and technical strength of private industry, government, and academia.
- Demonstrate a leveraged funding pool of federal and private monies via cost sharing to address issues of national importance.
- Provide ready access to demonstration results through an aggressive communication program.

One of the completed demonstrations is the Vehicle and Cargo Inspection System (VACIS)

Status and Accomplishments: The following demonstrations have been completed: AeroGo Air Lift Pallet System (Tech ID 2396), Vehicle and Cargo Inspection System (VACIS) (Tech ID 2912), Mega-Tech Blade Plunging Cutter (Tech ID 2953), NT Vision System (Tech ID 3069), and Mobile Characterization System (MCS) (Tech ID 2959). The Innovative Technology Summary Reports (ITSRs) for VACIS and the Mega-Tech Hydraulic Shears have been completed. The ITSRs for AeroGo, NT Vision System, and MCS are in the review process.

Technology selections for FY2001 have been made, although there are more than funding allows. Several demonstrations are in the negotiation phase: Race Scan, Electrochemical Decontamination, crate opening and Fog and Strip. In addition, an opportunity for a cerium nitrate demonstration at Rocky Flats Environmental Technology Site (RFETS) has been identified. Russian foam decontamination and electrochemical decontamination technology demonstrations are still under consideration.

Current Reporting Period Activities: The program status was presented at the Deactivation and Decommissioning (DDFA) Mid-Year Review (MYR). A meeting was held with Florida International University (FIU) personnel to review a conceptual prototype of the automated crate-cutting

tool. The Race Scan equipment arrived at LANL and was demonstrated to LANL Solid Waste Operations management. The test plan was approved.

For more information:

http://www-emtd.lanl.gov/LSDDP/DDtech.html

Tech ID 2203

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Mound Tritium D&D LSDDP

Objective and Scope: The Mound Plant in Miamisburg, Ohio, began operations in 1948. The site's mission, originally to fabricate the neutron initiator for the atomic bomb, expanded to include research, development, and production of numerous nuclear and non-nuclear weapons components, production of radioisotopically fueled thermoelectric generators, and surveillance of nuclear weapons components.

The objective of the Mound Tritium D&D LSDDP is to identify, demonstrate, and evaluate innovative technologies applicable to D&D of tritium facilities. D&D of Mound's surplus tritium facilities, the T and R/SW Buildings, provides a unique opportunity to compare, evaluate, and eventually execute innovative D&D technologies alongside baseline technologies in an ongoing project. The Mound LSDDP will identify and explore methods to improve worker safety while achieving cost and schedule savings. The project is expected to identify technologies that, when implemented in the Mound LSDDP, will produce significant savings compared to the $57.8 million baseline. The results and successes of this demonstration project will benefit similar DOE facilities and projects.

The T Building is an underground reinforced-concrete structure built in 1948 for the purification of polonium-210 used in nuclear weapons initiators. Later the facility was used

The Mound Plant, Miamisburg, Ohio commenced operation in 1948.

to extract other radionuclides, house the plutonium verification facility, and store TRU materials. Facilities large enough to handle multikilogram quantities of tritium were added to the building. Current plans are to decontaminate T Building to allow potentially unrestricted public reuse by the year 2003. The SW Complex and one corridor of rooms in the adjacent R Building form the SW/R Complex. Four types of operations have been performed in these facilities to support nuclear weapons programs using tritium: component development, component evaluation operations, tritium recovery, and material analysis. To meet DOE's vision of completing the environmental restoration of the site by 2005, the SW/R Complex will be demolished, and contamination beneath the building will be removed.

It is anticipated that innovative technologies will be applied to the following decontamination tasks:

- tritium-contaminated gloveboxes
- tritium characterization techniques
- productivity improvement technologies
- tritium specialties decontamination
- piping system removal and disposition
- mixed waste treatment and disposal
- tritiated water treatment
- contaminated water plume under SW building
- miscellaneous rad/non-rad traditional building materials disposition

The Mound LSDDP Integrating Contractor (IC) Team includes the following: Babcock & Wilcox of Ohio; Lawrence Livermore National Laboratory (LLNL); British

Nuclear Fuels Limited (BNFL); Foster Wheeler; IT Corp; LANL; Westinghouse Savannah River; Princeton Plasma Physics Laboratory (PPPL); and FIU.

The Tritium Clean-Up Cart was demonstrated as part of the Mound LSDDP

Status and Accomplishments:
Completed Demonstrations:

1. Portable Scintillation Counter(Tech ID 2311): The Lumi-Scint portable scintillation counter is a portable, single-tube liquid scintillation counter that can be set to respond to the low-energy beta radiation emitted from tritium. It uses a single photomultiplier tube and manual sample chamber. The Lumi-Scint operates on an internal battery or 110 VAC. The unit can be obtained with a printer, which allows hard copies of its electronically stored data.

2. Water Solidification (Tech ID 2312): This technology uses a polymer-based absorbent, Waterworks SP-400, that can be used to solidify aqueous waste. It is similar to other polymer-based absorbents that offer benefits over traditional solidification agents such as cement or Aquaset, the baseline solidification agent for the Mound facility. Benefits include the following: a high liquid-to-absorbent ratio; no mechanical mixing required to promote the absorption process; little to no volume increase in the waste after addition of the absorbent; and very high retention in the form of the gel-like material.

3. Oil Solidification (Tech ID 2313): This contaminated oil solidification technology, NOCHAR PetroBond®, is a high-quality polymer offered by NOCHAR®, Inc., of Indianapolis, Indiana, and is specifically designed as a petroleum-based liquid absorbent. The PetroBond® absorbs very quickly with little increase in volume. The PetroBond® can be used for free-liquid control in storage, transport, and disposal of low-level radioactive waste.

4. Tritium Cleanup Cart (Tech ID 2974): The Tritium Cleanup Cart is a portable tritium processing system. Used as a stand-alone cart for scrubbing tritium effluent, it provides a scrubbing process based on catalytic oxidation of tritium. Tritiated water is collected on removable molecular sieve dryers, which can be shipped as low-level waste below the 1080 curie "Type A" limit. The unit provides a projected decontamination factor of greater than 1000, with a process flow rate of 45 liters per minute. Design features include the following: mole sieve dryer beds configured in series with moisture monitors to prevent moisture breakthrough; process flow controllers in the main plumbing loop and air inlet system; process thermocouples, which provide process stream and enclosure over-temperature control; and an enclosure that can function as a ventilated hood during normal operating conditions, but can be isolated when tritium concentrations inside the enclosure exceed the pre-selected control setpoint.

5. Pipe Cutting and Crimping System (Tech ID 2955): The Pipe Cutting and Crimping System is a small hand-held, battery-operated crimping tool manufactured by Burndy Products. This tool utilizes a separate hydraulic pump with a high-pressure hose connecting the pump to the crimping head. U-shaped dies are contained in the head for crimping. A battery-powered hydraulic pump or an electric-powered pump can be used to develop 10,000 pounds per square inch (psi) of pressure to the crimping head. Thirty crimping operations can be performed before recharging is needed. The small dimension and light weight make this tool very suitable for crimping in tight quarters.

6. TechXtract® Chemical Decontamination of Metals (Tech ID 1450): TechXtract® is a contamination extraction technology that uses chemical formulations to remove con-

taminants from matrix surfaces and subsurfaces. Different chemical formulations are used for removal of specific contaminants from metal surfaces and subsurfaces. In this demonstration, the technology successfully decontaminated volumetrically contaminated stainless steel equipment. The demonstration showed greatly improved decontamination efficiency compared to the baseline method of decontamination using hydrogen peroxide.

7. Heavy Metals Removal from Mixed Waste Oils Using Self Assembled Monolayers on Mesoporous Supports (SAMMS) (Tech ID 1447): The SAMMS technology was developed by the PNNL for removal and stabilization of Resource Conservation and Recovery Act (RCRA) listed metals (i.e., lead, mercury, cadmium, silver, etc.) and for removal of mercury from organic solvents. The SAMMS material is based on self-assembly of functionalized monolayers on mesoporous oxide surfaces. The unique mesoporous oxide supports provide a high surface area, thereby enhancing the metal-loading capacity. SAMMS material has high flexibility in that it binds with different forms of mercury, including metallic, inorganic, organic, charged, and neutral compounds. It removes mercury both from organic wastes such as pump oils and from aqueous wastes.

8. Barter Process (Tech ID 3062): The Equipment Reuse, Bartered Sale of Used Contaminated Equipment to a Commercial Company (Barter Process) demonstration was recently completed. As a closure site, much of the DOE Miamisburg Environmental Management Project's equipment is planned for disposal. The Mound LSDDP team, instead of considering disposal as a first option, has demonstrated that there are benefits to the reuse of equipment at another facility or company over disposal. They recently completed a process to transfer used, tritium-contaminated equipment to a commercial company by means of a bartered sale agreement. The commercial facility was a Texas based NRC licensed pharmaceutical company. The Mound LSDDP team effectively applied the process knowledge and methodology developed by the DOE National Center of Excellence for Metals Recycle (NMR) in Oak Ridge to facilitate equipment reuse at many DOE sites. NMR checklists stepped through the entire process, and they also aided in evaluating potential equipment reuse prospects. The Mound Bartered Sale agreement was negotiated, and the first shipment of used equipment has been completed. Additional shipments will follow. As a result, DOE expects to avoid over $400,000 in equipment disposal costs and an additional $1 million by shortening the schedule for site closure. Based on the experience gained from accomplishing this project, the Mound LSDDP team is documenting the process so that other DOE sites can benefit from such equipment recycle and reuse agreements.

Current Reporting Period Activities:

1. Electret-Passive Environmental Radiation Monitor (E-PERM) (Tech ID 2315): The E-PERM® is a commercially available instrument designed to provide faster and less expensive means of determining the tritium contamination in air and on solid surfaces. For measurement of airborne tritium, the E-PERM® uses a chamber made of carbon filled polypropylene and a window made of thick carbon coated Tyvek® material, which is highly transparent to water vapor. For tritium surface monitoring, the E-PERM® system is used in a windowless mode. A mesh, supplied by the manufacturer, is used over the surface of a contaminated object before deploying the electret ion chamber to prevent contamination of the chamber. This demonstration was completed in May 2001.

2. Waste Isolation Composite (WIC) (Tech ID 3061): WIC is an ultra-high-strength composite material with high durability and low permeability that can be used for isolation or encapsulation of high-activity tritiated liquids. This is especially useful for disposal of liquid waste with high curie content tritiated water. During the current period, structural integrity tests were completed and the composite's performance was satisfactory. In the third quarter of 2001, radiological leach tests will be conducted.

3. Fiber Optic Tritium Detector and Quantifier (Tech ID 2956): This technology, developed by McDermott Technologies, Inc., uses a fiber optic bundle coupled to a photomultiplier tube detector to measure low

energy beta radiation from radioactive decay of tritium. It allows the fiber bundle to be introduced directly in the liquid (oil or water) sample for tritium detection and quantification. This technology demonstration has been delayed several times due to equipment malfunction and will be completed in the third quarter of 2001.

4. TechXtract® Chemical Decontamination of Concrete (Tech ID 1450): Also in the current period, demonstration of the TechXtract® chemical treatment to remove surface (and potentially near-surface) contamination from concrete was completed in a tritium laboratory at LLNL. In the third quarter or 2001, data will be collected to measure tritium-rebound effect to measure performance of the technology for removing below surface contamination.

5. Liquid Scintillation Vial Shredder and Disposal Process (Tech ID 3066): This technology developed as a follow-up to the successful demonstration and wide deployment of oil solidification (Tech ID 2313) was demonstrated during the current period. The process has proved very successful for disposal of liquid scintillation counting (LSC) vials used for laboratory analysis. The technology uses a mechanical shredder to crush the vials containing scintillation cocktail. It captures the shredded vials in a net and the scintillation cocktail is captured in a drum for treatment with NOCHAR N991. During the demonstration, five 55-gallon drums containing about 73,650 vials of LSC waste were processed. Following the successful demonstration, the shredder and disposal processes were deployed at Mound on June 19, 2001.

For more information:

http://www.doe-md.gov/lsdd/lsdd.htm

Tech ID 2201

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Idaho National Engineering and Environmental Laboratory INEEL Fuel Storage Canals and Associated Facilities D&D LSDDP

Objective and Scope: The INEEL Fuel Storage Canals and Associated Facilities LSDDP is led by an IC Team consisting of Parsons Engineering, BNFL, BBWI, TLG Engineering, FIU, and Idaho State University. This LSDDP will utilize funding, technologies, and expertise from the Offices of Environmental Restoration, Science and Technology, and Nuclear Material and Facility Stabilization, and from industry, universities, and the international community.

The project includes the following areas:

- Test Reactor Area 660 (TRA-660), housing two underwater research reactors, the Advanced Reactor Measurement Facility, and the Coupled Fast Reactivity Measurement Facility, with a 30,000-gallon interconnecting water canal that was sometimes used for fuel storage. These facilities were utilized for reactivity insertion experiments that were later scaled up for experiment design in larger reactors. The two reactors achieved criticality in 1960 and 1962, respectively. Neither has operated since February 1991. Contamination includes radioactive elements, lead, and chromium.
- TRA Filter Pit system, consisting of five structures containing large filters associated with test reactor operations. The facilities are contaminated with lead, radioisotopes, and deteriorating asbestos. The filters are located in restricted entry pits, and D&D work will have to be done remotely and in confined spaces.
- Test Area North 620 (TAN-620) Initial Engine Test Control Room, a massive underground, shielded, heavily reinforced concrete structure that served as the control center for the engine tests in the Aircraft Nuclear Propulsion Program conducted at the INEEL in the late 1950s and 1960s. Contamination includes asbestos, mercury, lead, and potential radiation.

This LSDDP is a high priority for the DOE/Commercial Nuclear Utilities D&D Consortium, with demonstrated technologies having deployment opportunities in the nuclear utility market through the consortium. Resulting deployments throughout the DOE complex alone could generate a potential cost savings and mortgage reduction of $20 million.

Eleven to18 innovative and improved technologies will be demonstrated in the areas of underwater inspection, characterization, and dismantlement; inspection, characterization, and dismantlement in restricted spaces; recycle of materials from D&D activities; removal of loose radiological contamination on walls, floors, piping, and equipment; removal of fixed radiological contamination on concrete; tank, vessel, and piping decontamination; lead plate radiological decontamination; and high-radiation exposure fields.

Status and Accomplishments: The 3D Gamma Locator Device (GLD) Technology, which includes the Isotopic Identification Device (IID) technology is currently awaiting demonstration since the technologies were released by the Russian Foreign Ministry and shipped to the United States.

Current Reporting Period Activities: The demonstration of the 3D GLD technology, which included the demonstration of the IID at TAN-616 was postponed due to delays in the Russian Ministry establishing a release date for shipment. The material was released by the Russian Ministry and shipped during the period. The demonstration has been rescheduled for July 2001.

For more information:

http://id.inel.gov/lsddp/

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Canyon Disposition Initiative

Objective and Scope: The Hanford Canyon Disposition Initiative (CDI) Project is a collaborative project that initially included participation across the DOE Office of Environmental Management (EM). Participating EM offices included the Offices of Waste Management Environmental Restoration, Science and Technology, and Nuclear Material and Facility Stabilization. This partnership was driven by the broad and significant impact that decisions made on the disposition of the canyons would have to all of these programs. Due to the reorganization of EM in September 1999, CDI is being overseen by the newly created Office of Project Completion.

The CDI Project is evaluating the feasibility of using the five chemical processing facilities (canyons) as assets for disposal of low-level wastes, instead of a mortgage liability. The 221-U Facility is being used as a pilot for this evaluation. The DOE Richland Operations Office (RL) Environmental Restoration Program signed an Agreement in Principle with the regulators at the beginning of FY1997, to conduct the evaluation for the disposition alternatives for the canyon facilities. In 1996, a Canyon Task Team of personnel from RL, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology (known as the Tri-Parties) conducted a series of workshops to identify an approach for the long-term disposition of the five main processing facilities in the 200 Area (B, T, and U facilities, the Plutonium Uranium Extraction Facility and the Reduction Oxidation Plant) at the Hanford Site. The assessment made by the Canyon Task Team centered on the possibilities of removing the processing facilities, leaving all or part of the facilities in place and identifying alternative beneficial uses for the facilities. The team concluded that the technical approach for dispositioning any of the facilities could be bounded by the following seven alternatives:

Alternative 0:
No Action

Alternative 1:
Full Removal and Disposal

Alternative 2:
Decontaminate and Leave in Place

Alternative 3:
Entombment with Internal Waste Disposal

Alternative 4:
Entombment with Internal/External Waste Disposal

Alternative 5:
Close in-Place—Standing Structure

Alternative 6:
Close in-Place—Collapsed Structure

The Record of Decision for the 221-U Facility will generate regulatory and technical precedence for future disposition of the other four remaining processing facilities at Hanford and other such facilities across the DOE complex.

Status and Accomplishments: Approximately $200,000 in funding from FY2000 has carried over into FY2001 for Phase III feasibility study and proposed plan for a record of decision. CDI has recently been awarded $700,000 additional funding through Pollution Prevention (P2).

Current Reporting Period Activities: No significant activity to report.

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http://bhi-erc.com/canyon/canyon.htm

Tech ID 2178

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Highly Selective Nuclide Removal System Accelerated Site Technology Deployment (ASTD)

Objective and Scope: In 1992, the last of the five DOE production reactors at Savannah River Site (SRS) was placed into shutdown mode, with no intention to restart. With this action, the site entered an extensive deactivation and long-term surveillance and maintenance life-cycle phase of these facilities. The integrity of the aging facilities has become a concern in recent years. Large volumes of contaminated water exist at some of these facilities at SRS (for example, fuel storage and disassembly basins). Treatment of this water requires removal of the water from the basin and shipment to the F and H Area Effluent Treatment Facility (ETF). A cost-effective and safe technology is needed to process the basin waters on location and selectively remove radioactive materials without transporting the water to ETF. The technology must reduce targeted nuclides to near DOE release limits and condition the water for direct release. Efforts to address these concerns have been initiated under the current funding for reactor monitoring and are being incorporated into the overall facility deactivation, decontamination, and decommissioning planning strategy. With the uncertainty of the basin integrity over time, a technology that can remove radioactive contamination from the basin water while minimizing secondary waste generation is essential to the success of the deactivation of the DOE reactor basins. The SRS ASTD is deploying an innovative, highly effective water treatment system to remove selected radionuclides (both strontium and cesium) from millions of gallons of water. Overall, D&D life-cycle costs are expected to significantly decrease via deployment of the technology.

Status, Accomplishments, and Current Reporting Period Activities:

No significant activity to report.

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Integrated Excavation Control System (IECS) (formerly Mobile Work Platform) ASTD

Plans are being developed for the acceptance testing of IECS to take place at Fernald.

Objective and Scope: This ASTD involves a partnership between Fernald Environmental Management Project (FEMP) and INEEL to procure and deploy an excavator arm with real-time sensors affixed, allowing precision excavation of above-Waste Acceptance Criteria (WAC) materials and real-time pre-certification surveys in complex terrain. This new effort is a redirection of the Mobile Work Platform project. The IECS will address real needs at Fernald and other sites that require the complex excavation of radionuclide-contaminated soils during the below-grade D&D of large structures.

Status, Accomplishments, and Current Reporting Period Activities: Excavation Monitoring System (EMS) design and construction is now complete. The EMS will undergo testing at INEEL prior to shipment to Fernald. Plans are being developed for the acceptance testing of IECS to take place at Fernald.

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Remote Size Reduction for Large Hot Cell Deactivation ASTD

Objective and Scope: The 324 Building, located at the Hanford Site near Richland, Washington, is being deactivated to meet state and federal cleanup commitments. The 324 Building has several highly radioactive tanks, tank vaults, piping, and large hot cells containing complex chemical processing equipment. To meet the cleanup commitments, there is a need to deploy more rapid and remote size-reduction, debris collection and removal, characterization, and decontamination methods. Readily deployable deactivation methods that reduce worker exposure, secondary waste generation, costs, and risks are also needed. Deployment of a remote/robot work platform in the 324 B-Cell with full reach capabilities will significantly accelerate work tasks, will eliminate the need for multiple, specialized tool design and procurement, and will reduce the overall program risks.

The Hanford Site ASTD project will fund the deployment of a robot work platform to support 324 B-Cell cleanup activities. Through this project, Hanford will procure and deploy a remote/robot work platform that is positioned with an overhead crane to perform deactivation activities. Following B-Cell cleanup, the work platform will be deployable for other Building 324 and Hanford site cleanup missions.

Status and Accomplishments: The contract with Cybernetix was modified to include fabrication of a special stand to allow the system to be placed in the airlock pipe trench for deactivation activities. These activities include cutting and plugging various size pipes, dismantling equipment, and removing sludge and other debris in the trench. Assembly, testing, and operator training for the system will be conducted at Hanford's 306-E facility. DOE-RL and the State of Washington Department of Ecology are negotiating a change in Building 324 deactivation milestones, which directly impact the deployment date of the work platform. System deployment is projected for the fourth quarter of FY2001.

Current Reporting Period Activities: The Cybernetix robotic platform was briefly demonstrated in the clean bay area, and the

pipe trench mock-up facility was inspected where the dry-runs for the actual deployment will take place in August. The Building 324 pipe trench deployment will be a warm-up run before deploying the system in the B-Cell airlock in FY2002. The Shielded Materials Facility hot cells, which are adjacent to the B-Cell, were toured to provide a feel for the D&D environment that will be encountered in the B-Cell.

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LANL Decontamination and Volume Reduction System (DVRS) ASTD

Objective and Scope: LANL currently has more than 2,400 cubic meters of oversized metallic TRU waste in storage. This waste is non-certifiable for shipment to the Waste Isolation Pilot Plant (WIPP) in its present packaging configuration. In addition, another 3,000 m^3 of similar waste from on-site D&D activities and site upgrades are at various locations at LANL. To meet the cleanup commitments, there is a need to deploy a system for decontaminating and volume reducing this waste that is less costly, less labor intensive, and quicker than the baseline method of processing the waste entirely by hand. The disposal of oversized, metallic TRU waste is a problem at many DOE sites.

The DVRS process will reduce the volume of oversized metallic TRU waste using an integrated system of technology and equipment for assaying, confinement, decontamination, and volume reduction. The project includes a 13,200-ft^2 outer building along with a 2500-ft^2 contamination control structure nested inside. Both structures have active ventilation and contamination control; a multi-station passive-active, neutron non-destructive analysis system; several fixed and portable processes for decontaminati on of metal objects; and a large dedicated system to shear and crush large metallic objects for placement in 55-gallon drums.

Status and Accomplishments: Both the outer building and contamination control structure are complete. The DVRS is slated to come online in August or September.

Current Reporting Period Activities: No significant activity to report.

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Tech ID 2242

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Oversize TRU Waste Laser Cutting System ASTD

Objective and Scope: DOE-Nevada has a need to size-reduce and characterize 58 oversized TRU-contaminated metal boxes with a total volume of 270 m^3 prior to shipping them to WIPP. The contents of these boxes are 32 contaminated gloveboxes, a metal cutting lathe, lengths of metal piping, lengths of angle iron, and various scrap metals. The Hanford material requiring size reduction includes a minimum of 150 gloveboxes, as well as ductwork and piping. At RFETS, the laser cutting system will also be applied to 150 contaminated gloveboxes.

Status, Accomplishments, and Current Reporting Period Activities: The laser cutting system integration testing continues at GSI-Lumonics. The robotic arms have been integrated with the laser cutting system. One robotic arm is for holding the cutting end-effector, and the other holds the object being cut. The estimated date for the laser system acceptance test by GSI-Lumonics was late June 2001,

The Oversize Transuranic Waste Laser Cutting equipment from GSI Lumonics is used in ASTD to diminish the size of TRU waste to fit into WIPP containers.

due to company personnel changes. Problems are also surfacing with the planned installation of the laser cutting system at the HAMMER facility at Hanford. Recent management changes there resulted in the estimated costs for use of the HAMMER facility to more than double, which is unacceptable for the available project budget. The Fluor Hanford project team is looking into alternative facilities (possibly a commercial facility) to install the laser cutting system for interim testing, as well as supplemental funding. LANL and Fluor Hanford project teams have been able to achieve sufficient cost savings to be able to include in the latest laser equipment procurement a rotating table to assist in holding the item being cut. The rotating table was in the original project scope, but had been deleted because of budget limitations.

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▼Smart 3D Characterization of the Brookhaven Graphite Research Reactor (BGRR) ASTD

Objective and Scope: The BGRR was a graphite-moderated and -reflected, air-cooled, thermal neutron research reactor that operated from 1950 to 1968. In 1997, following safe shutdown during the 1970s and 1980s, a site-wide review found radioactive water in the BGRR underground air-cooling ducts. Subsequently, it was determined that a comprehensive investigation of the environmental vulnerabilities and overall facility condition should be conducted. The first phase of this investigation involves characterization to support D&D planning of the BGRR facility including: the reactor building (701), reactor pile (702), fan house (704), instrument house (708) and canal house and outdoor pad (709). Characterization will also be needed to support waste disposal operations during decommissioning operations and to verify regulatory compliance following D&D operations.

DDFA supports the BGRR Decommissioning Project characterization effort through an ASTD project funded in September 2000. This ASTD project, Smart 3D Characterization, will deploy innovative characterization and sampling techniques coupled with 3D modeling capabilities to characterize soils and below-grade concrete ducts. These below grade ducts (BGD) connected the reactor pile with filters and fans to enable cooling air to be drawn through and exhausted. The ducts consist of two separate plenums measuring 10 feet by 14 feet by 170 feet each. The ducts collected rainwater following shutdown of the BGRR and are considered a potential source of subsurface soil contamination. If subsurface characterization does not show the soil surrounding the ducts to be contaminated, it may be possible to leave all or portions of the BGD in place rather than removing them. This will result in significant savings in remediation of the Brookhaven site.

Status and Accomplishments: The perfluorocarbon tracer (PFT) gas study has been completed ahead of schedule and the final report submitted. Based on the evaluation of the PFT data and review of the environmental visualization system (EVS) 3D representation of the data, potential leak locations along the north and south BGD were identified. These were displayed in 15 3D visualizations and tabulated in two summary tables. A 3D movie that can be viewed from all angles was prepared depicting the potential leak pathways. These visualizations indicate the location

and relative magnitude of potential water leaks in the ducts. Major findings for the south duct indicate the greatest leakage in the expansion joint in the bustle near Building 701 and at the expansion joint located 40 feet from Building 701. There is also strong evidence of leakage detected along the bottom of the duct in the filter bed region and expansion joint near the Instrument House. Many regions of the south duct did not leak. Major findings for the north duct indicate that the greatest leakage is at the bustle expansion joint near Building 701 (below the high water mark). In addition, a large uniform leak was observed at the filter bed expansion joint near the Instrument House and along both sides of the joint. Strong evidence of a leak was observed along the bottom of the duct approximately ten feet beyond the Building 701 bustle. Findings also indicate that the north duct leaked at a much higher rate than the south duct.

The results of the tracer gas study clearly indicated areas of high potential for leakage and these are the areas that will be targeted for initial sampling. Start-up of characterization activities is anticipated by late June. Several additional deployments of the In Situ Object Counting System (ISOCS) beyond the scope of this ASTD were initiated. Approximately 21 concrete shielding blocks from the Brookhaven National Laboratory (BNL) High Flux Beam Reactor (HFBR) are being characterized prior to final disposition. A second effort involves characterization of mixed waste mercury residuals from a thermal desorption process.

Current Reporting Period Activities: No significant activity to report.

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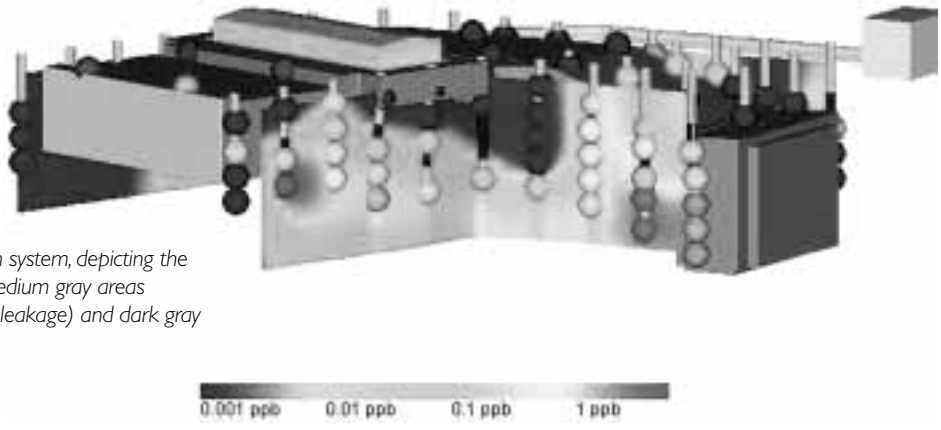
RFETS D&D Initiative and Associated ASTD Projects

Objective and Scope: RFETS is on an aggressive, accelerated schedule to achieve cleanup and closure by the end of 2006. The baseline plan for the Rocky Flats Closure Project involves dispositioning over 900 contaminated gloveboxes, more than 450 production process tanks, thousands of feet of ventilation system piping, and miles of production process piping. In order to accomplish this challenging goal, RFETS has incorporated into their baseline plan application of new and innovative technologies for characterization, decontamination, size reduction, and waste handling and packaging.

A significant cost in the D&D of buildings at RFETS is the size reduction and packaging of plutonium-contaminated gloveboxes, tanks, and other equipment. DDFA is supporting the disposition of these systems through the Rocky Flats D&D Initiative (RFI), as well as ASTD projects including:

- Enhanced In Situ Decontamination and Size Reduction
- Remote Operated Size Reduction System (ROSRS) (Tech ID 2916)
- Remote In Situ Size Reduction of Plutonium Gloveboxes (Tech ID 2987)



A 3-D visualization of the Environmental Visualization system, depicting the Below-Grade Ducts with simulated PFT leak data. Medium gray areas include higher concentrations of tracer gas (i.e., more leakage) and dark gray areas denote lower concentrations.

- Decontamination of Gloveboxes and Equipment without Size Reduction (Tech ID 2986)
- Upgrade Radiation Instruments
- Interbuilding Transfer of Plutonium Gloveboxes (Tech ID 3085)

All of these projects seek to identify and deploy proven, commercially available technologies and innovative systems that require only minimal modifications for the safe and cost-effective disposition of contaminated processing equipment and systems. The RFI serves to augment the ASTDs and to support problem-specific deployments not currently funded by an ASTD project, such as the characterization and eventual removal of concrete-embedded equipment in Building 776.

Status, Accomplishments, and Current Reporting Period Activities:

1. Enhanced In Situ Decontamination and Size Reduction

RFETS has initiated deployment of the Standard Waste Box (SWB) Counter, developed at LANL, for assaying TRU standard waste boxes. WIPP certification of the SWB is pending review of the initial data packages. RFETS expects full deployment of the SWB system beginning by the third quarter of FY2001.

2. Remote Operated Size Reduction System (ROSRS)

Due primarily to the success of the Inner Tent Chambers, a decision has been made not to deploy ROSRS at RFETS. DOE's Richland Operations Office and Flour Hanford, Inc. completed an evaluation of the ROSRS technology for potential deployment at the Hanford site. The results of the assessment indicated that there is no near-term application under the present budget constraints. SRS continues to express interest in transferring the system to their site for deployment, but no formal agreement has yet been reached.

3. Remote In Situ Size Reduction of Plutonium Gloveboxes

A contract has been awarded to RedZone Robotics for the in situ decommissioning of the high external exposure glovebox lines in Building 771. Fabrication of the system is underway and a validation demonstration is planned for late July 2001. The demonstration will be conducted at RedZone's facility in Pittsburgh, Pennsylvania, and will consist of cutting a mock-up glovebox. Delivery of the system is scheduled for late August 2001. The Remote In Situ Size Reduction System (ISSRS) will be used to size-reduce and package oversized gloveboxes and other contaminated equipment in Building 771 that cannot be transferred to a centralized size reduction facility.

4. Decontamination of Gloveboxes and Equipment without Size Reduction

This project supports the deployment of a suite of decontamination technologies to allow shipment and disposal of plutonium-contaminated gloveboxes, tanks, and other equipment while obviating size reduction requirements. By reducing surface contamination, this equipment can be disposed of as low-level waste (LLW), thus minimizing the total waste volume of material to be shipped to WIPP.

Agreements were reached between LANL and RFETS for the deployment of cerium nitrate steam injection for the decontamination of the first eight hot tanks. Test plans have been written and initial deployment testing began in late May. In late June, testing of Pipe Explorer (Tech ID 74) for characterization of the building 771 ducts began. Full deployment of both the cerium nitrate decontamination process and the Pipe Explorer are scheduled for the last quarter of FY2001. Contracts for vacuum grit blasting and vacuum carbon dioxide decontamination have also been awarded.

5. Upgrade Radiation Instruments

This project supports the deployment of a suite of state-of-the-art instrumentation and data collection systems required for compliance with radiation control, release limits, and control/tracking of waste. Procurements for high-resolution portable neutron-gamma systems and building characterization data loggers and certification of a large-area final building survey monitor have been completed. A mobile data integration system for residue processing is ongoing, with systems completed for ash and wet residues. Work is underway on systems for fluoride residues and D&D waste. Evaluation of radiation instruments for the characterization

and ultimate disposition of buried equipment is also underway.

6. Interbuilding Transfer of Plutonium Gloveboxes

This project was first funded in December 2000. At this time there are no activities to report. The purpose of this project is to design, fabricate, and install a remote system for on-site transfer of contaminated gloveboxes and other processing equipment to a centralized, size-reduction and packaging facility. The system will consist of a Standard Transport On-Site Management Package (STOMP) and Sealed Building Penetration Chambers. The system is expected to optimize size reduction and packaging activities on site, thus increasing productivity and improving D&D schedules. Though Kaiser-Hill still plans to obtain an Interbuilding Transfer System, final decisions regarding ROSRS have delayed design and fabrication of the system.

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Diamond Wire Saw Demolition and Size Reduction of a Reactor Bioshield ASTD

A diamond wire saw system is used to size-reduce an activated bioshield and associated structures in a decommissioned research reactor at Battelle's West Jefferson site.

Objective and Scope: The Columbus Environmental Management Project (CEMP) was awarded an ASTD project to deploy a diamond wire saw system to size-reduce an activated bioshield and associated structures in a decommissioned research reactor at Battelle's West Jefferson site in Columbus, Ohio. The bioshield is made of high-density concrete approximately eight feet thick with an extensive internal lattice of carbon steel reinforcement bars. This technology was used successfully in decommissioning projects at Fort St. Vrain and Shoreham Nuclear Power Plants, but has seen little application within DOE's decommissioning projects. The estimated cost to size-reduce the Building JN-3 bioshield at West Jefferson is $780,000 using the diamond wire saw, compared to an estimated $1,051,000 cost to dismantle the bioshield with the baseline technology of heavy jackhammers. Thus, size reduction using the diamond wire saw represents cost savings of about 25 percent compared to the baseline approach. Subsequent deployments of the diamond wire saw are planned for Mound and West Valley.

Status, Accomplishments, and Current Reporting Period Activities: The final report is being written and revised prior to publication.

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Reducing, Reusing, and Recycling Concrete and Segmenting Plate Steel and Tanks Utilizing a Universal Demolition Processor (UDP) ASTD

Objective and Scope: As D&D work at Fernald progresses from above-grade facilities to at-grade and below-grade facilities, there will be a need for new technologies to process concrete. Fernald can realize significant cost savings by reprocessing and reusing a portion of the site's concrete. There is a need for aggregate to build and strengthen the site's transportation infrastructure in and around the On-Site Disposal Facility (OSDF). Project personnel in the Soils and Water Division have an estimated need for up to 15,000 cubic yards of aggregate per year for the next six years. By not recycling the site's concrete, tons of aggregate will have to be imported from off-site locations and

The Universal Demolition Processor (UDP), by reprocessing a portion of the concrete, will reduce costs associated with the purchase of virgin aggregate and its subsequent disposal cost.

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subsequently disposed in the OSDF. Reprocessing a portion of the concrete saves the costs associated with the purchase of virgin aggregate and its subsequent disposal cost. The site can also realize increases in safety, efficiency, and schedule by utilizing the plate shear capability of the UDP. Fernald has numerous large, heavy steel tanks including two water towers and numerous tanks made of stainless steel.

Through this ASTD, innovative technologies will be deployed to accelerate demolition/recycling of construction materials for road construction and for segmenting large, hard to cut, plate steel and tanks. Overall, decommissioning life-cycle costs are expected to significantly decrease via the deployment of these technologies.

Status and Accomplishments: The UDP installation on the John Deere 450 excavator was completed in mid-April. The training in its use immediately followed. In late April, the initial deployment of the UDP occurred in the south fields' area.

Current Reporting Period Activities: The month of June was very successful for the UDP project. Over 450 yd^3 of concrete were processed. The UDP has performed well on a variety of concrete slabs and footers in the 3A area of Fernald's former production facility. Deployments for the month of June included the 10D pad (Oil Burner pad), the 10B pad (NE Boiler pad), a portion of 19D (North Tank Farm), and a portion on 20H (Process Water Tank).

Improved Measurement and Monitoring Systems (IMMS) ASTD

Objective and Scope: The FEMP is a 1,050-acre DOE Closure Site currently undergoing decommissioning and environmental restoration. As environmental cleanup work at the FEMP accelerates towards closure and long-term stewardship (LTS), there is an increasing need for new, innovative technologies to perform real-time physiological monitoring, land surveying, and wireless radon monitoring. In the process of D&D of DOE facilities, individual laborers sometimes need to work in or near radiological and hazardous locations, as well as in situations that lead to extreme physical conditions. These types of extreme conditions will likely occur in the upcoming FEMP Silos project and in other restoration projects across the site. Technologies are needed that reduce workers' risk during engineering, construction, and environmental restoration operations. To minimize these risks, three new technologies have been identified for deployment at FEMP. Collectively, these technologies will provide for the monitoring of worker vital signs, improved land surveying, and the remote transmission of radon monitoring data.

Status and Accomplishments: The wireless radon monitoring system was tested at the Campbell Scientific Inc. (CSI) facility. The initial 10 units were installed. CSI has asked for a no-cost contract extension. The

extension was agreed to and a requisition was submitted. In turn, CSI has given a detailed schedule of how it will complete the software integration with the existing system. The schedule calls for project completion by the end of August.

Current Reporting Period Activities: Additional software was procured for the prismless total survey station. A second major deployment of the technology occurred in May. Cost savings data are being generated.

A Siemens technology for remote physiological monitoring has been selected for deployment. The system is currently in the procurement process.

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Intrusive and Non-Intrusive Characterization through Concrete Walls and Floors ASTD

Objective and Scope: In mid-FY2000, the Miamisburg Environmental Management Project (MEMP) was awarded an ASTD project to ascertain the nature and extent of contamination in an area under SW Building known as the "Old Cave." The Old Cave is actually the entombed remains of a 1950's hot cell, which must be removed before the City of Miamisburg, Ohio, will accept ownership of the Mound site. In SW Building, the Old Cave is located under an area designated SW-19. Because of lack of knowledge of what is in the Old Cave area, ultra-conservative estimates of the amounts of actinium-227 and radium-226 have been made that required the Old Cave to be classified as a Category 2 Nuclear Facility. It is considered highly unlikely that that much radioactive material resides in the Old Cave. The approach is to characterize SW-19, the surroundings, and the entombment. In Phase I—Non-Invasive Investigations the entombment will be characterized using ground-penetrating radar and time-domain electromagnetic gamma spectrometry, drain exploration, and radon monitoring. In Phase II—Invasive Investigations, they plan to perform these investigations with respect to the entombment via diamond core drilling and/or geoprobe with a real-time position location determination device. Once radioactivity levels are determined and a final design decision to the Baseline Plan is made, several enhancements that shorten the schedule and reduce costs may result. A baseline recovery of only one week would recoup the entire ASTD investment. If the baseline acceleration is greater than the one week, the return on investment will increase proportionally as additional weeks/months are saved from the baseline. Based on the Value Engineering study, it is conservatively estimated that four months can easily be recovered when compared to the present technical approach.

Status and Accomplishments: The Phase I—Non-Intrusive Characterization Process Summary Report was completed in November 2000. During Phase I, non-invasive measurements were obtained using the following technologies: 1) ground-penetrating radar, 2) electromagnetic ground conductivity, 3) gradient magnetics, and 4) gamma spectroscopy. This characterization was to locate objects or structures buried within the entombment and to define the nature and extent of contamination. The best geophysical information was gathered from the topside of the entombment by electromagnetic surveying. Gamma spectroscopy measurements demonstrated evidence of both actinium-227 and radium-226 contamination in many areas. Thorium-232 and cesium-137 were also indicated. In addition, uranium-238 and cobalt-60 were identified on the surface in a few specific areas. These measurements indicate that radioactive soil contamination is present beneath the floors in the rooms adjacent to the entombment. Contamination appears to be present within the walls around the entombment, as measured from adjacent rooms. Measurements from directly above the old process area indicate that contamination has migrated

into the concrete cap. The gamma spectroscopy survey successfully identified and mapped the locations of subsurface radionuclides in the area, but was unable to quantify activity levels.

Current Reporting Period Activities: During the current period, the final report of the Old Cave Grouting Feasibility Study was issued and distributed. The proposed schedule, which is under review, has characterization activities around the SW/R buildings starting in September, with the walkover ISOCS gamma spectroscopy measurements. Contracts for the intrusive characterizations should be let in late September or early October, and all fieldwork should be completed by January 2002.

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Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM) Innovative Characterization at Nevada ASTD

Objective and Scope: The Nevada Test Site (NTS) deployment of the MARSSIM methodology and in situ characterization technologies will concentrate on non-standard applications, which present opportunities for significant cost savings when compared to the NTS baseline methodologies. These applications include radiological characterization of various structures and waste packages associated with D&D. This ASTD project consists of two components. The first component is the deployment of ISOCS, manufactured by Canberra Industries, Inc. This innovative technology will be used to assist in the radiological characterization of various structures and waste packages associated with the NTS D&D program. The second component is to use the MARSSIM methodology to verify that the exterior of the Area 25 Reactor Maintenance Assembly and Disassembly (R-MAD) facility can be released for disposal prior to demolition of the R-MAD structure. The purpose of this deployment is to compare the costs of conducting the MARSSIM release survey to the baseline methodology of a Radiological Control Technician (RCT) performing clearance surveys for each waste package.

Status and Accomplishments: BNL provided training to Bechtel Nevada personnel on the use of ISOCS for D&D applications. The training, conducted at BNL in March 2001, included taking actual measurements on various contaminated items using procedures developed by BNL. A graded, "hands-on" approach was used in which characterizations progressed from relatively simple to complex geometries. Data acquisition was followed by data-modeling training sessions in which each participant input data, ran the model, and reviewed the data for quality assurance.

Current Reporting Period Activities: In May 2001, BNL personnel provided further ISOCS training at NTS in preparation for supporting the MARSSIM roof verification survey and development of procedures to characterize waste containers. A series of qualitative ISOCS measurements were taken on several different metallic items scheduled for disposal located on the R-MAD grounds. These were followed by measurements taken at four randomly selected roof locations on one of the lower flat roofs of the R-MAD building. Small cesium-137 peaks were observed at three of the four roof positions. A quality control check revealed that the peak shifts were the results of the extremely elevated ambient temperatures (greater than 100∞F) on the system electronics. The following day, a series of five locations were measured at another R-MAD roof location at an elevation of approximately 75 feet using a combination of tripod and unmounted configurations. Both roofing material (concrete and tar paper layers) and a large metal discharge stack were measured. Initial modeling indicated that there was minor cesium-137 contamination present on the lower roof. No detector peak shift was evident even in

the heat of the day, indicating that the elevated ambient temperature effects were not consistent. After further analysis, the contamination was attributed to adjacent ductwork.

In situ soil measurements were also taken in an area close to a railroad car decontamination station located within the R-MAD facility yard. Modeled results will be used to compare the data with the ISOCS detector.

Prior to implementing MARSSIM for the exterior survey of the R-MAD facility, two Bechtel Nevada technical staff attended a week-long training course to gain experience in implementing MARSSIM methodologies and tools and in the development of MARSSIM survey plans. A MARSSIM survey plan was developed for the exterior of the R-MAD facility. Based on process knowledge, the exterior of the R-MAD building was never impacted by facility operations. Therefore, a Class 3 survey plan was developed for the building exterior.

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Contaminated Large Equipment ASTD

Objective and Scope: SRS has identified over 600,000 cubic feet of radiologically contaminated large equipment (CLE) requiring disposition. This represents a much larger quantity than anticipated as the site proceeds into more D&D. DOE Order 435.1 will elevate regulatory attention and surveillance impacts for this stored material with significant cost increase for deferring permanent disposition. Disposal of this material as-is would consume the SRS waste disposal capacity, be cost prohibitive, and waste DOE assets.

SRS proposes to obtain the following equipment to augment existing infrastructure and to facilitate the size reduction and decontamination of CLE:

- Large-span PermaCon Hut for containment
- Robotic/remote operated shears
- Robotic/remote operated plasma arc cutting system
- Robotic decontamination system

The approach proposed above capitalizes on the remote-operation technologies and equipment to minimize health and environmental risks, as well as to accelerate cleanup and reduce costs while meeting project objectives. This equipment will be used in conjunction with the SRS Decontamination Center to provide capabilities for disposition of large equipment and to support ongoing routine decontamination work.

Status, Accomplishments, and Current Reporting Period Activities:
No significant activity to report.

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Deployment of Improved Technologies for Cleanout of the F-Reactor Fuel Storage Basin ASTD

Objective and Scope: Cleanout of the F-Reactor Fuel Storage Basin (FSB) is a key step in completing the Paths to Closure for the Hanford Site. The F-Reactor FSB has complex technical issues and unique challenges, including the identification, removal, and disposal of miscellaneous contaminated debris, which is potentially interspersed with pieces of spent fuel elements buried under

6.1 meters (20 feet) of sandy soil. The technical needs associated with the project include characterization, backfill removal and segregation, and material removal and segregation.

Historical data and preliminary characterization information indicate that the top 5.2 meters (17 feet.) of fill should be free of radiological or chemical contamination and that most of the debris is expected to be found primarily in the lower 15% of the basin.

Status and Accomplishments: The Gamma Cam, the Long Range Alpha Detector (LRAD), and the Brokk remote excavation vehicle have been deployed.

Current Reporting Period Activities: Two technologies, the Remote Retrieval System and the Compact Remote Console, were deployed on the F-Reactor FSB ASTD in June 2001. The innovative technologies deployed at the F-Reactor FSB can be used on other Hanford reactor D&D projects. These technologies can reduce the cost and worker risk while transitioning those facilities to an Interim Safe Storage (ISS) state for long-term monitoring and surveillance.

The Remote Retrieval System consists of a Brokk 330N remote excavator with appropriate attachments for the remote excavation, dismantlement, and retrieval of soils and debris from the FSB. The Compact Remote Console, used to control the Remote Retrieval System, consists of an ergonomic command chair with four flat video panels positioned directly in front of the operator.

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D&D Consortium

Objective and Scope: In December 1997, DOE signed a Memorandum of Understanding (MOU) with the Electric Power Research Institute (EPRI) and several nuclear utilities to jointly develop and deploy new D&D technologies. DOE's objective is to expand the reach of benefits of the leading-edge technologies being deployed within the DOE nuclear complex. The MOU Consortium established a charter in early 1998 and identified challenging technological areas common to both DOE and the commercial industry. Both DOE and commercial sites will be used for these demonstrations and deployments.

DOE and EPRI are collaborating to conduct quarterly workshops at various nuclear plants around the country, each focusing on a particular decommissioning area. DOE and the utilities present the most recent, innovative technologies to improve productivity and worker safety while reducing cost. The workshops will solicit feedback from hands-on plant managers and field workers. Topics covered to date address low-level waste disposal, concrete decontamination, embedded pipe decontamination, and site characterization.

Status and Accomplishments: The first technology demonstration resulting from the DOE/EPRI/Utility Consortium was completed at the Rancho Seco Nuclear Power Plant.

The first technology demonstration involved the concrete shaving technology developed by Marcrist Industries, Ltd. Two separate pieces of equipment were demonstrated. Both used a diamond-impregnated shaving drum as the cutting tool for removal of the concrete surface. Generated dust was collected by a vacuum system and deposited in a waste drum.

The first piece of equipment was a self-propelled, electric powered floor shaver. It was demonstrated on clean and radioactively contaminated floor areas in the reactor turbine building. Several parameters were recorded as part of the demonstration and the technology was well accepted by the operating staff.

The second piece was a hydraulically powered wall-shaving unit. For purposes of

the demonstration, the unit was mounted on a forklift.

Current Reporting Period Activities: No significant activities to report.

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Florida International University

Objective and Scope: The Hemispheric Center for Environmental Technology (HCET) at FIU is working on several D&D related research projects under a grant awarded by the DOE Office of Science and Technology (OST). These FY2001 projects include:

- D&D Technology Assessment Program
- Technology Information Management and Dissemination
- Technology Development, Integration, and Deployment Program
- Worker Health and Safety Research and Technology Development
- D&D Waste Disposition and Treatment
- Long-term Monitoring and Stewardship for DDFA

Status and Accomplishments: Under this project and earlier technology assessment projects funded from other sources, FIU-HCET has assessed over 80 baseline and innovative technologies for D&D application under standardized, non-nuclear testing conditions.

Current Reporting Period Activities:

Technology Assessment Program (TAP):

The Technology Evaluation Summary Report for CyTerra's Three-Dimensional Integrated Characterization and Archiving System (3D-ICAS) demonstrated at FIU-HCET on May 14–18, 2001, has been completed and is included in the FIU-HCET monthly progress report.

The TAP planned and assisted the technology demonstrations that took place at the D&D Mid-Year Review Symposium (April 17–19, 2001) in Miami. The following vendors and technologies were demonstrated:

- Keibler-Thompson KT-30 with a variety of end tools
- International Union of Operating Engineers (IUOE) with CORTECH Body Temperature Control System
- Canberra radiological characterization system (FIU-HCET)
- FIU-HCET's In-Situ Pipe Decontamination System
- Bartlett Services' Wall Monitor (Characterization)
- Tri-Tool's Clamshell Lathes

Technology Information Management and Dissemination:

The Health & Safety and Waste Management Databases have been populated and are searchable at http://www.dandd.org. The technology needs forum is complete and web-site graphics are being finalized.

Technology Development, Integration, and Deployment (TDID) Program:

A Zero-added Waste technology was tested for potential integration into the In Situ Pipe Decontamination System. The technology, a steam blasting system called Vapor Viper System by T&T Technologies, was tested in May.

The In Situ Pipe System, the MIP-DC characterization unit, and the On-Line Decontamination and Characterization Systems were mobilized and demonstrated at the DDFA Mid-Year review meeting.

Demonstrations on improved cutting technologies started during the second week of June to test for health and safety hazards, operational parameters, setup, and utility requirements. The Tiger-vac is still under procurement. TDID will not get a shear technology because it is currently being used at Hanford 233-S as a waste-mitigating tool for cutting operations. Procurement periods could affect the schedule of the demonstrations.

Worker Health and Safety Research and Technology Development:

No significant activities to report.

D&D Waste Disposition and Treatment:

No significant activities to report.

Long-Term Monitoring and Stewardship for DDFA:

No significant activities to report.

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International Agreement with AEA Technology

Objective and Scope: Through an International Agreement, the DDFA has engaged AEA Technology to use their knowledge and expertise to address specific D&D problems throughout the DOE weapons complex. In FY2001, AEA is supporting four projects, which emphasize the transfer of proven innovative technologies from the United Kingdom and Europe to the DOE complex.

Status, Accomplishments, and Current Reporting Period Activities:

Accessing & Sampling the Retention Basin at the INEEL Test Reactor Area:

It is estimated that between one to three feet of sludge remain unevenly distributed across the base of the retention basin at the Test Reactor Area (TRA) facility in INEEL. In 1972, the retention basin—a below-grade concrete settling tank 128 feet long by 40 feet wide by 15 feet deep—was found to be leaking. As the first step in the eventual removal of the tank from the ground, AEA will work with site engineers to establish the best methods of gaining entry to the basin for sampling, inspection, and retrieval of the sludge. On June 26, 2001, a project review meeting was conducted at the TRA facility. The AEA team recommended the following approach. Twelve holes should be drilled about 6 to 8 inches in diameter through the concrete ceiling above the standing and hanging baffles along the length of the basin. A single robotic arm, similar to the one recommended for Tank 105 in the High Level Waste Vault in Building 324 in Hanford, should be deployed through each opening and used to characterize and sample the unknown environment. The robotic arm should start with the baffles at the north and south ends first and transverse to the center segments. The DOE project managers appeared to be receptive to these AEA recommendations. The AEA team hopes to deploy an improved system in FY2002 with support from the DDFA and cost sharing from INEEL. At the end of July, the AEA team will meet with the DDFA project manager to discuss the potential work for next fiscal year.

Deployment of an Artisan™ Manipulator for Debris Retrieval from a Hot Cell Facility at the Columbus Environmental Management Project (CEMP):

AEA Technology will provide Battelle Columbus a hydraulic manipulator mounted on a mobile platform for size reduction, decontamination, and removal of debris from the West Jefferson hot cells. The manipulator—an ARTISAN™—will replace the existing master slave manipulators, which were not designed to perform the required tasks. The ARTISAN™ has been deployed throughout Europe to perform tasks similar to those required at West Jefferson. AEA Technology will provide operator training as well as the necessary documentation required for operations and maintenance of the ARTISAN™ arm. This deployment will save significant time and will reduce potential worker dose compared to using conventional manipulators with the existing crane in a more hands-on operation. On May 16, personnel from West Jefferson observed the ARTISAN™ at AEA's facility in Pittsburgh, Pennsylvania. Operator training began the following week, and the system was shipped to Columbus on June 19 and installed on June 20. The system is now ready for deployment following site-specific mockup training.

Removal of Waste from the WD Complex at Mound:

Building WD is a multi-story facility used for the treatment of low specific activity radioactive wastes generated by process activities at Mound. The contaminated facility is 28,800 square feet and has exterior walls of reinforced concrete and concrete block. The roof is concrete slab. As the first step in the D&D of the facility, 33 waste

tanks, and other miscellaneous vessels must be emptied and removed. AEA personnel will assist Mound in determining the optimal approach for gaining entry into the tanks to allow sampling, inspection, and retrieval.

Deployment of a Hydraulic Manipulator for Hot Cell Decommissioning in Building 324 at Hanford:

AEA Technology will provide a robust, tele-operated ARTISAN™ manipulator system that has a greater reach and higher payload capacity at full extension than the baseline mechanical master slave manipulators currently in use at Hanford's 324 hot cell facility. The ARTISAN™ will be assembled to the specifications provided by the 324 Facility personnel, and will be capable of being deployed through the 324 hot cells' standard 10-inch manipulator ports, with the option of configuration to a mobile platform. This hydraulic manipulator system will provide the ability to handle waste materials, deploy size reduction tooling, assist with inspection and assessments of radiological hot cells, and provide the ability to deploy radiological decontamination tooling for the 324 facility hot cells and tanks. AEA personnel are currently consulting with U.S. vendors to complete fabrication of the manipulator hydraulics and control system. Delivery of the system to Hanford is expected by September 2001.

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Small Business Innovation Research (SBIR) Program

Objective and Scope: The SBIR Program was established in 1982 under the Small Business Innovation Development Act. The objectives of the Program are to stimulate technological innovation; to use small business to meet federal research and development (R&D) needs; to encourage the participation by disadvantaged and minority persons in technological innovation; and to increase private sector commercialization derived from federal R&D.

In December 2000, the SBIR Program was re-authorized until September 30, 2008. Congress concluded that the SBIR program was successful in providing small businesses with opportunities to compete for federal R&D awards and that the SBIR had effectively stimulated commercialization of the resulting technology, benefiting both private and public sectors.

SBIR programs fund R&D efforts of a high-risk nature that have high commercial potential. Under the Small Business Innovation Development Act, each agency with an extramural R&D budget in excess of $100 million must establish an SBIR Program.

The SBIR Program is a three-phase process. Phase I is based on proposals submitted in response to solicited research topics by participating agencies. The purpose of Phase I is to evaluate and demonstrate the scientific and technical merit and feasibility of an idea. Phase I proposals describe the projected results of the proposed research, the approach to be used and how it will prove the feasibility of its approach. Phase I research efforts are typically six months in duration and awards normally do not exceed $100,000.

Companies that successfully complete Phase I can compete for Phase II funding to expand on Phase I results and continue development of the technology. Phase II is the principal R&D effort, generally lasting 24 months. Awards typically do not exceed $750,000.

Status and Accomplishments: Five FY2000 Phase I proposals have been selected for Phase II awards. The awards are as follows:

(1) Arm Automation, Inc., *Modular Robotics for Delivering On-Site Contamination Sensors and Mapping System to Difficult-to-Access Locations*;

(2) AUTOMITIKA, Inc., *PipeTaz: Automated Pipe Asbestos Insulation Removal System*;

(3) ADA Technologies, Inc., *Portable Multicontaminant Detection Instrumentation for R&D*;

(4) Intelligent Optical Systems, Inc., *Intelligent Unmanned Monitoring of Remediation Sites*; and

(5) X-Ray Optical Systems, Inc., *Compact Polycapillary Based Microbeam X-Ray Fluorescence Analysis System for Remote Monitoring of Metal Contamination*.

Current Reporting Period Activities:

Photon Imaging, Inc. (Phase II)

Next-Generation, Portable XRF System—Photon Imaging, Inc. (PII) has optimized construction of a spectrometer in terms of its performance, power consumption, size, and weight. The assembled spectrometry package that utilizes a small thermoelectrical cooler has been tested for X-ray response to a wide range of energies showing better energy resolution than that of cryogenically cooled Si [Li] systems with detectors of the same active area.

Small Animal Spect Camera for Quantitative Molecular Medicine—PII is currently developing a new silicon photosensor to replace the photomultiplier tubes used in current systems. The Si-PIN detectors promise improvement that will allow extremely fine detail of less than 1 millimeter in SPECT images of mice.

Large-Area, High-Performance Silicon Drift X-Ray Detectors—PII has finalized development of the design for a closely spaced detector array prototype composed of nineteen elements, 0.5 square centimeter each, with closely integrated front-end electronics and developed higher yield, more cost-effective production processing of the SDDs. The packaging was designed to minimize the mass and associated electronics behind the detector array.

Fast-Timing Silicon Drift Photodetectors for Pem—Several design and silicon processing run iterations were performed with resulting improvements in leakage current and quantum efficiency. PII has designed and is currently fabricating the optimized 8-millimeter by 8- millimeter scintillator blocks, with individual 2-millimeter by 2-millimeter parallel-piped elements.

Radiation Monitoring Devices, Inc. (RMD) (Phase II)

Advanced Avalanche Photo Diodes (APD) Based Spectroscopic Radiation Imager—RMD is carrying out research for the advanced development of compact arrays of APD with specialized readout capability. Modeling of the active contact on the rear of the APD is completed and the Field Effect Transistor (FET) approach has been chosen. Since choosing the FET-APD readout scheme, an examination of the discrete components required for implementation and package design issues have been started and are now well underway. Several discrete-component readout scheme variants have been modeled and plans to assemble preliminary circuitry are underway.

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2.2 Facility Characterization

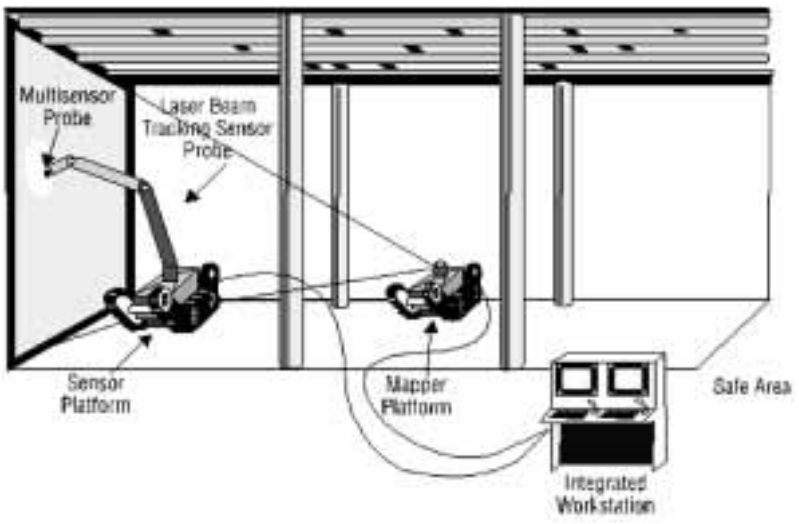
Three-Dimensional Integrated Characterization and Archiving System (3D-ICAS)

Objective and Scope: Coleman Research Corporation (Coleman) will develop a remote system that can rapidly analyze in situ hazardous organic and radionuclide contaminants on structural materials. This remote system is the Three-Dimensional Integrated Characterization and Archiving System (3D-ICAS). The 3D-ICAS consists of a mobile sensor platform and a mobile mapper platform that operate in contaminated areas, and an integrated workstation that remains in a safe location. Development of this technology will occur in three phases.

Status and Accomplishments: The 3D-ICAS was successfully integrated with mobile platforms at Oak Ridge National Laboratory. The Coherent Laser Radar Mapper was operated on the OmniMate robotic platform, and the contaminant analysis units and robot arm carrying the multisensor probe head were integrated on the overhead transporter. The system was subsequently demonstrated at Oak Ridge National Laboratory's Robotics and Process Systems Division in October 1998. The demonstration was conducted in the hi-bay area using a wall unit specially constructed for the demonstration. The wall unit consisted of pieces of cement-based wallboard and a small piece of an asbestos-containing material. The wall unit was purposely contaminated with low-levels of organic materials, alpha emitters, and a beta emitter. The demonstration consisted of mapping the wall unit, displaying the map, selecting the points to be surveyed, and running the contaminant survey. The survey required moving the sensor/analysis unit with the transporter, acquiring the sensor unit with the 3D mapper, displaying the measured contamination in real time, and displaying detailed spatial and contamination data after the survey was completed. An unfortunate hardware failure the day before the demonstration prohibited acqui-sition of contaminant data from the high-speed gas chromatography/mass spectrometry (HSGC/MS). Only the Molecular Vibrational Spectrometer (MVS) provided real-time identification of the substrate material during the demonstration. This was a significant success since the MVS correctly identified the wallboard as being cement, although the particular substrate sample had not been included in the system's neural network training set. Failure of the HSGC/MS was unfortunate, but its performance had been well documented and demonstrated before the demonstration at ORNL. The failure did not detract from the main objective of the demonstration, which was to show end-to-end system operation with the 3D-ICAS mounted on ORNL mobile platforms. The GC/MS was shipped back to Thermedics, parts were replaced, and the system was recalibrated.

Current Reporting Period Activities: The 3D-ICAS system was shipped on May 11, 2001, to Florida International University's Hemispheric Center for Environmental Technology (FIU-HCET) for demonstration and validation of the design modifications. These modifications included simplifying the design from a two-vehicle system to a single mobile platform, integration of the XRF sensor for enhanced substrate analysis, and upgrading of the IWOS operating system.

The contractor was able to demonstrate the CLR mapping and the movement of the sensor probe to selected locations on the test wall. The XRF sensor was demonstrated but the HSGC/MS sensor had failed.



Three-Dimensional Integrated Characterization and Archiving System (3D-ICAS) is a remote mapper and sensor platform to use in contaminated areas.

The cause of the HSGC/MS failure is believed to be that the HSGC/MS electronic modules, which control the heating of two of the gas transfer elements, may have been damaged during the required field debugging. The contractor is currently compiling results from the demonstration into their final report.

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Fast Response Isotopic Alpha Continuous Emissions Monitor

Objective and Scope: The objective of this effort is to develop and test Continuous Air and Emission Monitoring (CAEM) instrumentation for alpha-emitting radionuclides. This instrument will be designed in order to certify the proper performance of airborne emissions from ambient air and in equipment emissions encountered during D&D of DOE's surplus facilities. The proposed system will also meet the DOE's alpha CAEM requirements through the development of an innovative, high-resolution, online air/gas alpha monitor. The instruments will be capable of operating as a stack emissions monitor, as a process control instrument, or for the control of off-gas from decontamination, dismantlement, and air handling equipment.

Initial efforts will be focused on the development and evaluation of a rapid alpha-counting-based instrument to monitor ambient air and emissions to meet the monitoring and equipment control needs of surplus facilities undergoing decontamination and decommissioning. This development will establish the feasibility of a prototype instrument for use in detecting radionuclides that are present or that will create susceptibility to exposure throughout the DOE complex. The prototype instrument will be tested under the supervision of DOE's Inhalation Toxicology Research Institute in Albuquerque, New Mexico. Based on the prototype results, efforts may be continued to full-scale commercial prototype for demonstration in one of DDFA's LSDDPs.

This project is a two-phase developmental effort. Phase I involves the design, development, and preliminary testing of a laboratory-scale instrument. Testing will initially be conducted using naturally occurring radon progeny in ambient air. If the optional Phase II is exercised, the Phase I instrument will be critically evaluated at the Lovelace Respiratory Research Institute (LRRI) with characterized plutonium aerosols. Then an improved instrument will be built and field-tested at a suitable DOE site.

Status and Accomplishments: Informal meetings were held with various DOE CAEM end users. The personnel associated with LANL's upgrade of their continuous air monitoring system for the Plutonium Facility at Technical Area 55 (TA-55) are very interested in the further development of the Fast-Response CAEM. LANL is interested in hosting the Phase II field-test at the LANL TA-54 LSDDP.

During February 2001, NETL was informed that Thermo Technologies, a subsidiary of ThermoPower, was being eliminated. They were developing the Fast Response Alpha CAM for air monitoring under the DDFA.They have completed the development of a first prototype and an advanced prototype unit, and were scheduled to perform a field demonstration under the LSDDP this summer.

Current Reporting Period Activities: The alpha air monitor was transferred successfully to the ESH group at LANL recently, where they will use the instrument in everyday operation. No further development is planned. The alpha water monitor was also transferred to the radioactive liquid waste treatment facility at LANL for their use. The water monitor was developed with similar technology under a previous contract with ThermoPower. The project is now in closeout.

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Technology for Real-Time Measurement of Surface and Airborne Beryllium

Objective and Scope: The objective of this contract is to develop, test, and demonstrate an innovative real-time monitor for surface and airborne beryllium. This field-portable device is based on Laser-Induced Breakdown Spectroscopy (LIBS) and will be applicable to continuous air monitoring; field analysis of filters from personal air monitors, and analysis of surface wipe samples. Another potential application is a point and shoot device for direct measurement of beryllium on a surface. Accurate and timely detection, and monitoring of beryllium is critical to worker safety during deactivation and decommissioning activities. Beryllium dust is a significant workplace hazard. Exposure to beryllium particles can cause a serious illness in certain people. This illness is chronic beryllium disease (CBD)—an irreversible and sometimes fatal scarring of the lungs. Beryllium metal has been produced for various industrial uses and has been widely used in aerospace and defense applications. The baseline method for beryllium analysis is sending samples to an off-site laboratory, which may require days or weeks to obtain results. The Rocky Flats Environmental Technology Center (RFETS), Oak Ridge, Y-12, LANL, and the DOD have beryllium issues.

Status and Accomplishments: On September 30, 2000, a contract was awarded to Science Engineering and Associates (SEA) to develop a technology for Real-Time Measurement of Airborne and Surface Beryllium. The contractor has been working to establish lines of communication with RFETS, where demonstration of the instrument is planned. Following minor revisions to the Scope of Work, a subcontract was issued to Lovelace Respiratory Research Institute (LRRI). Under this subcontract LRRI will prepare various beryllium on-filter samples for SEA, provide laboratory space at the LRRI facility for SEA to conduct LIBS measurements of beryllium filters, and provide consultation related to the design of the beryllium monitor. The SEA design staff held its first design meeting where the conceptual design for the prototype monitor was defined. Slight refinements to the conceptual instrument design were made to incorporate the input from the Rocky Flats technical contacts.

Current Reporting Period Activities: In this quarter, system fabrication and method development continued. SEA conducted LIBS tests with a laboratory system on beryllium-contaminated filters provided by RFETS personnel and performed some analysis on beryllium filters of unknown concentrations.

The custom software required to communicate directly with the charged coupled device (CCD) detector on the Chromex spectrometer and the X-Y stage was completed and tested. This software allows the operator to fully specify a rectangular grid pattern for sparking the filter during the method development measurements, and collect the spectral data from the CCD detector.

A final selection was made of the robotic arm that will be used to manipulate the filter cassettes between the various internal stations and will provide the positioning of the sparking chamber under the fixed laser beam. A Mitsubishi RV-1A robot arm, controller, and teaching pendant were ordered and delivered. Initial programming and design work that will be required to define the robot work zone and optimize placement of the various stations within the CAM/Wipe Module was begun on this system.

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2.3 Facility Decontamination

High Productivity Vacuum Blasting System

Objective and Scope: The objective of this project is to improve the productivity and economy of existing vacuum blasting technology, which is used to remove radioactive contamination, PCBs, and lead-based paint while providing worker protection through continuously recycling of the material and dust from the decontamination tasks. This project will focus on redesigning and improving existing vacuum blasting components, including blast head nozzles, ergonomic handling of the blast head by reducing its weight, brush-ring design, vacuum level regulator, efficiency of dust separator, and operational control sensors. The redesign is expected to enhance the productivity and economy of the vacuum blasting system by at least 50 percent of current vacuum blasting systems.

LTC Americas will develop the necessary mathematical models of air-particle flow in the nozzle, in the blast head and interface area, and in the dust separator to study the flow characteristics and interaction of the various elements of the system. The purpose of this model development is to increase the productivity and economy of existing vacuum blasting technology by 50 percent. Based on the results of this modeling effort, the contractor will test the system and verify that the above system components perform according to the mathematical simulations. The contractor will then complete the preliminary design of the components of the proposed system. This will include an overall configuration of the system, including material selection and testing, definition of the range of dimensional and weight parameters, and conceptual arrangement or design of the blast head unit and dust separator unit. Based on the preliminary design, the contractor will procure components and perform fabrication and assembly of the proposed system.

The performance of the system will be evaluated in the laboratory mock-ups representing various cleanup situations and environments. The contractor will review, analyze, and interpret data collected from the tests and develop a productivity enhancement profile of the pre-prototype unit including economic analysis. Based on the laboratory test results, the contractor will modify, change, and make adjustments to enhance the capability of the system.

Status and Accomplishments: Phase I has been completed. In Phase I, mathematical models and related code were developed to simulate the entire process numerically. Based on the date from the model, an innovative rectangular nozzle and a new centrifugal separator were designed, manufactured, and tested. The tests were performed to verify the mathematical models. The numerical results agreed with the measured data with a deviation within 10 percent. Experimental results also showed that if the new innovative design rectangular nozzles replace the old circular nozzle, a more than 50 percent increase in productivity efficiency can be achieved. The newly designed centrifugal separator offers a high-efficiency separation increase from about 30 to 75 percent, even using finer abrasives.

Phase II has been completed. During this phase the pre-prototype design of the improved high efficiency vacuum blasting system was tested at Florida International University (FIU). The results demonstrated an improvement in productivity of 53 percent for concrete cleaning and 38 percent for steel plate over the original design.

The design and fabrication of a commercial prototype will be conducted during Phase III of the contract. During this phase of development, design features from the pre-prototype that hindered improvements in productivity will be removed. The heavy weight and poor handling characteristics of the nozzle head are examples of such features. This should lead to additional improvements in productivity.

The contractor has initiated Phase III. Design and testing has been conducted to optimize the orientation of the nozzle configuration.

Current Reporting Period Activities:

The performance testing of the ¼-inch prototype blasthead was conducted at FIU-HCET site during the week of April 16, 2001. The LTC 1060 machine with the centrifugal separator designed in Phase II was used in this test. The coated steel plate was cleaned by using the ¼-inch prototype blasthead with G80 grits. (The test results indicated: 1) the prototype blasthead worked well, as expected; 2) the productivity rate

of the prototype can be increased at least 50 percent more than that of the baseline technology; and 3) the configuration of the prototype blasthead is almost optimum.)

There were problems experienced in the recent test of the ¼-inch nozzle. They are being corrected by enlarging the diameter of the air curtain and placing internal baffles within the air curtain plenum. The performance test for the change is scheduled for the week of July 23 at FIU.

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Tech ID 2224

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Technology Deployment for Asbestos Destruction

Objective and Scope: Asbestos Recycling Incorporated (ARI) was awarded a firm fixed-price contract to process 10,000 pounds of Asbestos-Containing Material (ACM) from the Savannah River Site. ARI's thermochemical treatment unit consists of modular components designed for hazardous waste treatment. The system will be used to remineralize asbestos resulting in non-toxic, non-regulated, asbestos-free aggregate suitable for recycling. The modular systems include a waste pretreatment system, rotary hearth, off-gas processing system, and a product-handling system. These systems are designed to accommodate a variety of waste types and contaminants.

Status and Accomplishments: The contract was awarded to ARI on September 30, 2000. On October 20, National Energy Technology Laboratory held a project kickoff meeting that included a presentation from ARI describing the technology to be used, the scope, schedule, and other pertinent aspects of the project. In early October 2000, ARI coordinated with DOE's Savannah River complex and DOE's asbestos abatement contractor to arrange for abated asbestos to be picked up by ARI's selected trucking contractor. ARI contracted with Freehold Cartage, Inc., Eutawville, South Carolina, to pick up the asbestos and transport the material to ARI's facility located in Tacoma, Washington. During this time, ARI also secured a permit from the Puget Sound Air Quality Agency that allows temporary storage of the asbestos pending the issuance of a final and permanent permit.

The asbestos was loaded onto the Freehold Cartage truck on October 18, 2000 and was transported without incident to Tacoma on October 23, 2000. The 441 bags of asbestos were unloaded into a steel shipping container, which was then properly labeled and locked. The asbestos will remain in storage until processed.

Current Reporting Period Activities: ARI has assembled the thermochemical conversion unit that will destroy the Savannah River Site asbestos waste at their Tacoma facility. They are currently conducting unit shakedown tests. Once the system is fully functional, the ARI team will begin testing with surrogate oils in preparation for a Toxic Substances Control Act (TSCA) validation scheduled for late July. They anticipate initializing the processing of Savannah River Site asbestos waste in August or September 2001.

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2.4 Facility Dismantlement and Material Disposition

Robotics Crosscutting Program (Rbx)

Objective and Scope: The Robotics Crosscutting Program (Rbx) supports the DDFA through design and integration of remote systems and capabilities used for near-term facility deactivation and ongoing surveillance and maintenance activities with extended application to final facility decommissioning. Deployment of remote D&D systems will reduce worker exposure to hazardous environments and provide productivity increases leading to substantial cost savings. Rbx also provides the technical interface for ongoing activities conducted by the NETL Industry Programs and the University Research Program in Robotics (URPR) in the area of remote/robotic systems development.

Status and Accomplishments: During FY2001, Rbx is continuing the development of two remote systems: the Telerobotic Manipulation System (Tech ID 2181) and Telerobotic Control (Tech ID 2939). The Telerobotic Manipulation System was established as a project within the Rbx D&D product line as a new start in FY1999. From Rbx interactions with the Tanks Focus Area, a similar near-term need was identified for a remote system to perform decontamination of pits associated with underground storage tanks at Hanford. Thus, the Rbx D&D activity was merged with the Rbx Tank Waste Retrieval (TWR) project for development of a prototype "Pit Viper" system. The Rbx D&D product line has assisted in the conceptual development of the Pit Viper system and have provided operator console and telerobotic controls technologies for use in the system. The long-term target for D&D deployment of this system is within plutonium processing canyons at Hanford or Savannah River.

The Telerobotic Control development activity addresses improved remote operation by providing advanced controls capabilities for remote manipulator systems. These advanced controls capabilities will increase effectiveness and efficiency of remote operation. This technology will be integrated with the Compact Remote Console (Tech ID 2180) and deployed within the Telerobotic Manipulation System.

Current Reporting Period Activities: Activities have been initiated leading to a telerobotics demonstration using the Schilling manipulator and a plasma torch. This effort will demonstrate a series of prototype D&D tasks using the compact console operator and telerobotic control algorithms and prototype software. Integration of these two systems into the telerobotic manipulation system will provide path building and path planning/trajectory generation capabilities. The path builder identifies points in the real world with which the telerobot needs to work, and the path planner generates the intended path and the graphical user interface for execution. A precision sonar standoff sensor was integrated into the arm to facilitate testing of planned path execution. The sonar sensor will quantify and minimize the source of position and orientation errors in the Schilling manipulator so that precision cutting can be conducted. Efforts were also initiated on tool fixturing and storage for the plasma torch and related support tools, such as a variety of saws and/or shears.

In a collaborative effort, INEEL Rbx staff have and transferred the Compact Remote Console (CRC), to Bechtel Hanford, Inc. for integration into a Brokk 330 to perform D&D operations in the 105-F Reactor fuel storage basin including excavation and potential fuel fragment cleanup. The original Brokk set-up consisted of a video station operator performing remote camera operations and an equipment operator outfitted with the Brokk joystick controller standing behind the video station. The new setup integrates the Brokk controller into the CRC such that the Brokk operator can sit in an ergonomically correct control station viewing images from remote operations. Initial feedback from Hanford D&D operations was very favorable. The current D&D schedule with this equipment is completion of a 26-hour verification and system operability test and then approximately 1.5 months to complete the fuel basin clean-up activities. This activity is a potential subsequent deployment of the CRC at another DOE site.

INEEL Rbx staff is also assisting in the upcoming demonstration of two Russian technologies as part of the INEEL Fuel Storage

Pit Viper Cybernetix manipulator system

Canals and Associated Facilities LSDDP. The two technologies are a remotely operated Gamma Locating Device (Tech ID 2991) and an Isotopic Identification Device (Tech ID 3063). The technologies will be mounted on an INEEL-owned, non-tethered robotic vehicle, and will quantify the gamma radiation and provide isotopic readings. The system also provides video footage, which would be critical in areas where radiation levels prohibit, human entry. The technologies will be demonstrated at the Test Area North (TAN) 616 facility in July, and assuming a successful demonstration at TAN 616, the technology will subsequently be deployed at Power Burst Facility cubicle 13 in support of ongoing D&D activities.

Pacific Northwest National Laboratory (PNNL) Rbx staff began training on the Pit Viper Cybernetix manipulator system. This training is the beginning step in learning about the control system and potential application of telemanipulation.

PNNL Staff hosted tour of Pit Viper cold test facility for the Hanford Site Technology Coordinating Group Management Council.

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2.5 Worker Safety and Other Projects

Protective Clothing Based on Permselective Membrane

Objective and Scope: Membrane Technology and Research (MTR), Inc., is developing and demonstrating improved protective clothing that provides protection equivalent to current garments, but is lighter weight to improve comfort and is breathable to allow water vapor to escape, therefore reducing heat stress. Improved protective clothing will be made of an innovative ultra-thin, permselective outer membrane. The membrane is extremely permeable to water vapor escaping from the wearer, but highly impermeable to hazardous compounds. Fabric properties will be optimized and prototype suits will be tested during Phase I. In Phase II, 20-30 suits will be fabricated and used in a variety of extensive, comparative trials in the laboratory and at a non-hazardous site.

Status and Accomplishments: Development of fabric materials and laboratory tests on the fabric has been completed. In laboratory tests, water vapor transmission rates of 600x900 g/m^2/day have been measured through the fabric. This water vapor transmission rate is far superior to butyl rubber suits with a water vapor transmission rate of 0x10 g/m^2/day. Chemical vapor transmission rates have been equal to or lower than rates for the fabrics of commercial suits.

Uretek laminated two rolls of the fabric. One roll of fabric (90 meters by 30 inches), MTR1, uses rip-stop nylon as both inner and outer layers, and the second roll (40 meters by 30 inches), MTR2, uses the rip-stop nylon on the outside and a flexible, lightweight, non-woven fabric on the inside. The prototype suits manufactured by Kappler Systems received the following tests by outside laboratories: chemical permeation, physical properties, sweating mannequin, and heat stress modeling. In general, the results are not as good as expected; although the fabrics do combine water permeability and reduced heat stress with chemical protection, neither the chemical permeation resistance nor the reduction in heat stress was as high as hoped. The economic analysis was updated based on this new data. The analysis shows that MTR1 provides the greatest benefits in productivity; however, the benefit does not appear to justify the higher cost of the suit made of this fabric. MTR2 fabric has less productivity benefit and a higher selling price, and so is less attractive than MTR1.

The Phase II permselective garment testing by the International Union of Operating Engineers (IUOE) was concluded in August 1999. The garments tested for personnel comfort and well-being were those assembled by MTR's potential commercialization partner from the permselective fabrics supplied by MTR, Tyvek, and non-breathable garments like Saranex. The garments were all full bodysuits with hoods (for comparison purposes), and contained a more spacious cut in the chest and waist/crotch area than other manufactured garments, and this was very noticeable and appreciated by the test personnel. This also helped the garments to be more durable. Examples of tasks performed include crawling through confined spaces, performing metal grinding, and loading and hauling material in a wheelbarrow. In general the MTR garments were as comfortable with respect to heat-stress as the Tyvek garments, and were much more comfortable than the non-breathable garments. The test personnel all had very good comments concerning the MTR garments. Communications have been initiated with a potential commercialization partner and an economic analysis has been initiated.

Current Reporting Period Activities:

Communications regarding the permselective membrane garments were reestablished with MTR's potential commercialization partner late in May 2001. They will reinitiate their review of the International Union of Operating Engineers Garment Test Report of the MTR permselective membrane garments assembled by the potential partner. In the meantime, Jeff Stull, MTR consultant, and MTR continue to assemble the final garment economic analysis and the project final report. A no-cost time extension to September 24, 2001 has been granted to MTR to complete the economic analysis and the final report.

An innovative fabric combines an ultrathin, permselective outer membrane with a sorptive inner layer.

For more information:

Tech ID 95

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Modular Manipulator for Robotic Applications

Objective and Scope: This project focuses on the needs of Automated Plutonium Processing (APP) tasks that involve the manipulation of plutonium containers and the transfer of their contents. Specific challenges of APP gloveboxes include restrictive entry ports, confined workspace, limited maintenance access and destructive plutonium particulates, which make this task virtually impossible to automate with existing technology.

In order for automation systems to be successful within DOE facilities, they must provide maximum functionality, flexibility, ease of use, and reliability, while facilitating the rapid deployment of each custom system. This work concentrates on in-depth design and deployment of self-contained actuator modules, which will be used to construct a robotic manipulator tailored for APP tasks. A human-scale manipulator will be built from two sizes of DISC Actuator and will replace existing human labor within plutonium gloveboxes. The modular nature of ARM Automation's technology readily enables installation and maintenance of automation within "hot" boxes.

Status and Accomplishments: A survey of the state-of-the-art modular manipulators design is completed. This survey addresses modular manipulators developed inside government laboratories, universities, and private industry for such applications as space exploration or control research and commercially viable industrial applications. Based on this study, it is possible to define the requirements of one manipulator system that can be used to conduct automated transfer operations within plutonium gloveboxes and some D&D applications. The test plan for the testing of the manipulator at ARM's facility has been completed. Integration of the subcomponents has also been completed and the system has been prepared for testing.

All of the manipulator components have been fabricated and assembled. Two sizes of actuators were built: ARM20 and ARM32. The ARM20 modules have been assembled and individually and collectively tested as a manipulator system. The ARM32 modules have been individually tested and are presently undergoing system testing. The quick connects for the Link20's have been fabricated and tested.

To date, all goals of the project have been accomplished except the final system testing with a system that incorporates the ARM32 modules. A 4 degrees of freedom system with a reach of 790 mm consisting of 3 ARM20s mounted on a linear track has been tested for repeatability and accuracy. The repeatability was found to be 0.075 mm and the accuracy was 0.50 mm after the manipulator was disassembled and reassembled. The payload of the manipulator shown above is 3 kg without the end effector. The payload of a similar system with ARM32s is designed to be 11 kg.

Current Reporting Period Activities: ARM is concluding the testing of the ARM32s and continuing the testing of the system incorporating the ARM32s, ARM20s and Pacific Scientific systems. The University of Texas (UT) effort on the tele-operational environment for the manipulator is also just about complete. UT is presently packaging up its software to be passed off to ARM for implementation within Cimetrix. The UT effort on the obstacle avoidance implementation is also complete and is being packaged with the tele-operational software. ARM Automation performed manipulator tests at its own site. ARM is presently working on completing the final report for this project.

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Tech ID 2199

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3.0 Programmatic Structure and Organization

The Office of Science and Technology (OST), as part of DOE's Office of Environmental Management (EM), manages a national program to conduct basic and applied research, and technology development/demonstration/deployment that is essential to completing a timely and cost-effective cleanup of the DOE nuclear weapons complex. OST provides environmental research results, as well as cleanup technologies and systems to meet EM program high priority science and technology needs while reducing technological risks and cost of implementation of effective solutions. The OST works closely with both the Office of Site Closure (EM-30) and the Office of Project Completion (EM-40) to accomplish its mission.

To achieve a comprehensive, integrated approach to developing and providing science and technology solutions, EM has separated the site cleanup needs into a set of five problem areas. A Focus Area has been established to plan and manage EM's research and development investments to develop solutions to each of these five problem areas:

- Deactivation & Decommissioning Focus Area
- Tanks Focus Area
- Nuclear Materials Focus Area
- TRU and Mixed Waste Focus Area
- Subsurface Contaminant Focus Area

In addition, three crosscutting technology areas were established where technology needs and targets are relevant to more than one Focus Area:

- Characterization, Monitoring and Sensor Technology (CMST)
- Efficient Separations and Processing (ESP)
- Robotics

The Industry Program conducts competitively selected activities that involve the private sector in developing, demonstrating, and implementing improved technologies that address the needs of the focus areas and the crosscutting areas.

The result of this structure of programs is that the D&D Focus Area is positioned to support those research areas defined as highest priority by EM-50 and DOE customers.

The Role of NETL

The Federal Energy Technology Center, with physical sites in both Pittsburgh, Pennsylvania and Morgantown, West Virginia, was redesignated by Former U.S. Secretary of Energy Bill Richardson, as the National Energy Technology Laboratory (NETL). As the 15th national laboratory, NETL becomes part of the national laboratory research system. This is the largest research system of its kind in the world with more than 30,000 engineers and scientists conducting research and research and leading-edge experiments. As part of this system, the new National Energy Technology Laboratory will join Argonne National Laboratory (Illinois); Brookhaven National Laboratory (New York); Lawrence Berkeley National Laboratory (California); Fermi National Accelerator Laboratory (Illinois); Idaho National Engineering & Environmental Laboratory (Idaho); Lawrence Livermore National Laboratory (California); Los Alamos National Laboratory (New Mexico); National Renewable Energy Laboratory (Colorado); Oak Ridge National Laboratory (Tennessee); Pacific Northwest National Laboratory (Washington); and Sandia National Laboratories (New Mexico and California).

Rita A. Bajura, NETL Director, a career federal executive with more than 18 years experience in government-industry energy partnerships, continues in her leadership position as head of the single management team that serves both physical sites with a combined working force of more than 530 federal scientists, engineers, and administrative staff. NETL is responsible for nearly 600 research projects; most involving the development of advanced fossil fuel technologies.

In addition to the new national laboratory's core capabilities, Secretary Richardson announced that a newly created Center for Advanced Natural Gas Studies, would be an integral part of NETL's research endowment.

Senator Robert C. Byrd (D-WV) remarked in the course of the dedication that, "Much of the laboratory's work is dedicated to the worthy goal of developing innovative, clean and efficient technologies that will allow our nation to meet its growing energy needs.

As the nation's newest national laboratory, it will continue to help light a pathway for a new era of energy use that will ensure a comfortable standard of living for our children and our children's children."

NETL also manages a significant portion of the technology development needed to clean up sites in the government's nuclear weapons complex. In February 1995, the then Morgantown Energy Technology Center was selected by EM-50 to be the implementing organization for the D&D Focus Area. As such, it brought the experience gained from being the implementing organization for the Industry Program, which competitively selects industrial R&D performers through Research Opportunity Announcements (ROAs) and Program Research and Development Announcements (PRDAs). As the lead organization for D&D implementation, NETL is responsible for the planning, monitoring, and evaluating RDDT&E pro-jects to meet the requirements of EM-50 and its customers in EM-30.

Stakeholder Feedback

The stakeholders in the D&D Focus Area include DOE headquarters; DOE operations offices; DOE sites and their operating contractors; D&D technology developers and users in the private sector; federal, state, and local regulators; and the communities around affected DOE facilities. These stakeholders have been providing input to focus area planning and implementation; program contacts are provided on the first page of this report.

"It's time we elevate the profile and prestige of this world-class facility, which has been helping solve energy and environmental problems for more than 50 years,"

Bill Richardson, Former U.S. Secretary of Energy,
National Energy Technology Laboratory
Dedication Ceremony

4.0 Background

The D&D Focus Area was established to develop and demonstrate improved technologies and systems that could solve customer-identified needs to characterize, deactivate, survey and maintain, decontaminate, dismantle, and dispose of or recycle DOE surplus facilities and their contents. The mission also includes facilitating the acceptance, approval, transfer, commercialization, deployment, and implementation of these technologies and systems.

These technologies are needed to address the pressing needs of deactivating more than 7000 contaminated buildings and decommissioning more than 700 buildings. In addition, material disposition is required for over 600,000 tons of metal and 23 million cubic meters of concrete in contaminated buildings and for 400,000 tons of metal currently in scrap piles. The major drivers for this focus area are the high safety and health risks associated with working in aged and contaminated facilities and the high costs associated with facility deactivation, sur-veillance, and maintenance using currently available baseline technologies.

D&D Focus Area Strategy

Subsequent to the selection of NETL as the lead organization for the D&D Focus Area, a program review of all FY95 projects was held in May 1995. Based on this and other recent program reviews, as well as the general requirement for fiscal constraint throughout, the following strategies were developed:

Programmatic Strategy

- Focus D&D technology development program on large-scale demonstrations emphasizing full-scale demonstrations using a suite of improved technologies.
- Demonstrate technologies only through large-scale demonstrations.
- Focus on technologies that are identified as high priority by customers, that have wide applicability, and that have a commitment to be considered for use by customers.
- Emphasize demonstration and deployment of private-sector technologies.
- Technical Strategy

In the near term, emphasize technologies to effectively support:

- deactivation of facilities,
- decontamination of surfaces,
- reuse of bulk contaminated materials,and
- application of remotely operated dismantlement systems

In the middle term, emphasize technologies to effectively support:

- applications of remote surveillance systems,
- characterization of volumetrically contaminated materials,
- decontamination of bulk materials, and
- adoption of release standards for bulk contaminated materials.

Large-Scale Demonstrations and Deployment Projects

A cornerstone of the D&D Focus Area is its series of large-scale demonstration and deployment projects. The LSDDPs demonstrate innovative and improved D&D technologies at full scale, side by side with existing commercial technologies. The intent is to compare benefits from using a suite of improved and innovative D&D technologies against those associated with baseline D&D technologies. This approach provides an opportunity to test improved and innovative D&D technologies at a scale that will provide meaningful cost and performance information to the potential end-users of the technology.

5.0 Upcoming Events

September 2001

American Nuclear Society Decommissioning, Decontamination & Reutilization Meeting

September 23–27, 2001
Knoxville, TN

November 2001

American Nuclear Society Winter Meeting

November 11–15, 2001
Reno, NV

Technology Information Exchange Conference

November 13–15, 2001
Albuquerque, NM

We list conferences and workshops of interest to our readership. Please let us know if you would like us to include your event on this page.

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